



E INDEPENDENT GUIDE TO IBM-STA

APRIL 11, 1989

PC Labs Tests 15 Fax Boards That Really Work

No Hassle Fax

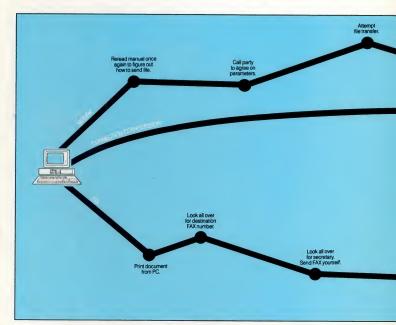
NEARD PERSONAL COMPUTING

After Hours: Managing Your Money 4.1

Plus 3 New Tools for Personal Finance

- DOS and Unix: Marriage of Convenience?
- More Power for Your LaserJet: 6 PostScript Add-in Boards 2 HP Speedup Boards Plus Free PC Magazine **Printing Utility**
- What IBM Forgot to Tell You **About Presentation Manager**

Intel announces



Announcing the first non-stop communications route between businesses anywhere in the world.

Intel's Connection CoProcessor."

It's a whole new way to send and receive programs, files, text, graphics and electronic messages. Not just between PCs. but with fax machines as well.

The Intel Connection is a new communications coprocessing board that frees your PC from the task of communicating.

Which means you can work on your computer non-stop—even while

sending a document as big as the NewYork phone book.

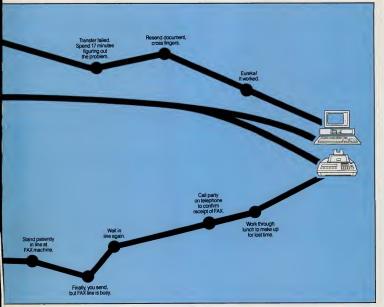
Now your faxes or files can fly cross country. And you can still be zooming around in your flight simulator. Or writing that letter to your biggest account. Or recalculating your spreadsheets for tomorrow's meeting. Without interruption or downtime.

And when you fax, there are no more stopovers at the printer, or cooling your heels in line at the fax machine. Because Connection lets you do everything without leaving your PC. And when you send files directly to



© 1989 Intel Corporation, Connection CoProcessor as attachmark of fined Corporation WorldPerfect is a registered trademark of WorldPerfect Corp. Symantec is a trademark of Symantec Corp. Borland is a registered trademark of Microsoft Corporation "CAS (DCA/Intel Communicating Application Specification.)

non-stop flights.



another Connection-equipped PC, you won't have to fiddle around with modemparameters or protocols. Because the Connection CoProcessor sets them for you. At 9600 bps.

Best of all, Connection supports CAS, a new communication standard that is supported by major software and hardware developers like Symantec, Borland, DCA, Microsoft, and WordPerfect. Which means you can send, for example, a word processing file to your London office, without ever exiting your WordPerfect program.

You just send the document directly from your application. That's it. There isn't any complicated

communications software to learn.

And everything is backed by toll-free technical support and a five-year warranty from Intel.

So what are you waiting for? Call 800-538-3373 now for a free demo disk.

Because with Intel's Connection CoProcessor, communication is really going to take off.



Corporation, DCA is a registered trademark of Digital Communications Associates, Inc. Microsoft is a registered

This is abou

At this moment, millions of Lotus 1-2-3° users are faithfully awaiting the arrival of a product called Release 3. A characterbased product that promises greater power

Microsoft Excel

Microsoft Excel. Or, how to see Lotus 1-2-3 Release 3 from a whole new perspective.

and greater productivity for serious spreadsheet users. As soon as it

gets here.

In the meantime. we have a question: If Release 3 is in fact character-based.

and the entire per-

sonal computing industry continues moving toward graphics-based environments, is it wise to wait for Release 3? Or consider the

alternative.

Actually, you can do both. Because you have nothing to lose by seeing the other side of the spreadsheet story, and trying it for yourself.

It's called Microsoft® Excel. The spread-



Unfortunately, 1-2-3 won't let you move, size, and link an unlimited number of files at the same time. Fortunately, Microsoft Excel will.



As you know, with 1:2:3 your ability to customize worksheets and charts is limited.

As you may not know, with Microsoft Excel the possibilities are limitless.

sheet specifically designed for graphic environments-the industry's emerging standard. Five minutes in front of a demo will show you the fastest.

Print | Concel al 1987 . Dec 198

easiest, most enjoyable way to crunch your numbers. Thanks to an incredibly intuitive design that exploits innovations like Micro-

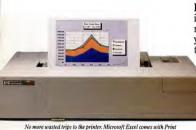


soft Windows, OS/2 Presentation

Manager and, of course, the Macintosh." You're a loyal Lotus user. If you're a bit skeptical, we fully understand that. We also anticipated it. So we've made sure your hardearned equity in 1-2-3 is not

obsolete. In fact, we've not only made a transition to Microsoft Excel attractive, we've also made it easy: Microsoft Excel actually reads and writes

otus I-2-



No more wasted trips to the printer. Microsoft Excel comes with Print Preview for true WYSIWYG. Unlike Release 3.

1-2-3 files and even helps translate macros. It also offers the convenience of 1-2-3 on-line help—so you can expect a surprisingly smooth

transition. In fact, the West Coast Sales *******

slash key you punch to access your 1-2-3 commands is the same key that can access Microsoft Excel commands-vou don't have



As Lotus may or may not have told you, Release 3 will need a substantial investment in new hardware. The same hardware that runs Microsoft Excel. All we're saving is, if voure committing to new machines, make the most of those new machines. Something Release 3 simply won't.

But using is believing. So we've made it convenient to get a sample of Microsoft Excel in your hands. Simply call us at

(800) 541-1261. Dept. 114 for a free sample disk of your own. It's worth the call. It's worth the experience.

In fact, we're so confident about Microsoft Excel that we're offering a noquestions-asked. money-back guarantee good through January 1990. Which means we're actually willing to guarantee



call for a sample disk. The disk is free. But the experience is priceless.

our current technology against Lotus technology that isn't even available vet.

All of which brings us to a decision millions of you are about to face:

Upgrade to character-based Release 3. or upgrade to the power and simplicity of a graphics-based spreadsheet. We're not saying it's an easy decision.

Just an inevitable one.

Microso Making it all make sense:

GOLDEN BOW SYSTEMS



Fast free-form retrievalany format, any disk path

Integral multi-window editing

Hot links to your applications

Pull-down menus

Mouse support

DOS and OS/2

(800) 284-3269

CIRCLE 369 ON READER SERVICE CARD

\$270 US shog \$5 CA orders add 7% GOLDEN BOW SYSTEMS 2870 5th Avenue San Diego, CA 92103 (619) 298-9349 FAX (619) 298-9950

TELEY 201520 GRS 119

EDIT WHAT'S INSIDE

There's a visionary in some people all of the time, and in all people some of the time-especially when it comes to choosing tomorrow's systems. As many PC users question whether to make the move from DOS to OS/2, PC Magazine's coverage of this controversial operating system will continue to focus on issues relevant to both end users and programmers.

In the spirit of forward thinking, we're not suggesting that you rush out and buy OS/2 today or even this year. Instead, we've asked contributing editor Charles Petzold-whose Environments column is the first ongoing series devoted to OS/2 programming to appear in any magazine-to write an article about the future of PC application software. That story has been influenced by a dramatic change in the modes of interaction be-

tween user and computer, culminating in a more inviting entrée into computing: the graphical user interface (GUI). For OS/2. that means the Presentation Manager.

Although the PM was released officially only recently, it's not new to Petzold. As the author of the book Programming the OS/2 Presentation Manager (Microsoft Press, 1989), he was the first journalist to see this new GUI before it went public. and he has been writing programs for it for more than a year.

Petzold describes the rationale for centering Environments on programming for the PM this way: "Because the PM is the primary environment for future OS/2 applications, programmers should be looking at PM the earliest. They're the ones



Contributing editor Charles Petzold created the opening art for his article by writing a PM program.

who have to write the applications that the rest of us will use." The viability of OS/2 depends on programmers' getting their education now, because the operating system will become useful to most users only when a sufficient number of PM applications exist.

Just as programmers should find Petzold's column a harbinger of the new world of object-oriented environments. end users should find his feature article in this issue an invaluable introduction to concepts that are likely to determine the look and feel of the next generation of applications. With this kind of reporting, no one can say we haven't done our part to prevent the future from arriving prematurely.-Robbin Juris

PC Magazier. The Independent Guide to BBM Standard Proceed Comparing ISSN (17888-1857) is published to worthy compare high and August for 539-97 for our pay CET on 22d Communication CS, One Park Area, New York, NY 19316 Second Class process paid New York, NY 19316 and as additional uniting CESS (INSTRUMENTS). Addition of CR Magazier. P. De New St. Assoc. Comparing paid of New York, NY 19316 and as additional uniting CESS (INSTRUMENTS). Addition of the Comparing Poly New St. Assoc. Comparing paid of New York, NY 19316 and as additional uniting CESS (INSTRUMENTS). Addition of the Comparing Poly New St. Assoc. Comparing paid of New York, NY 19316 and as additional uniting CESS (INSTRUMENTS).



"The QMS JetScript controller is the best way available to add PostScript capabilities to a Hewlett-Packard LaserJet Series II printer."

-PC Week Sept. 19, 1988 Hewlett-Packard* and QMS* have made it easy to give your LaserJet Series II* the desktop publishing power of the PostScript* page description language.

The new QMS JetScript™

JetScript is the only Adobe PostScript controller upgrade authorized by HP and designed specifically for the LaserJet Series II. JetScript gives your printer the industry-standard page description language to accompany HPs PCL printer language. This expands your laser printing capabilities. Increases overall printer performance. Yet preserves HP functionality and warranties.

Do it yourself JetScript is easy to install. Just plug in two cards (one in your personal computer*, the other in your printer), connect a cable and install the software.

The result is a PostScript system with 35 resident Adobe typefaces, three megabytes of RAM, and QMA SAAP" (Advanced System Architecture for PostScript) proprietary technology for superior performance. All for less than half the cost of a new PostScript laser printer.

New forms of expression The speed and power of JetScript combine to give your LaserJet Series II a form of expression that's found only with PostScript.

Simply, PostScript opens up the full range of possibilities for desktop publishing. You have complete control over the final look of the page, down to the last exacting detail. PostScript allows for an infinite number of four touraistions and sizes. That makes PostScript's limitless flexibility and power the perfect complement to your LaserJet Series II, giving you the high-quality output you require.

Impressive results People have come to expect impressive results from QMS—one of the first companies to bring the power of PostScript to laser printing, and now with more PostScript-based products than any other company.

You'll get the same results from the new JetScript. After all, it has HP's blessing.

Laser Connection is a sales and marketing subsidiary of QMS. Call 1-800-523-2696 for the location of your nearest Laser Connection dealer.

*JetScript available for IBM PC-XT", IBM PC-AT", HP Vectra™ and compatible personal computers, or the IBM PS/2™ Model 30.



A QMS Company

The following are trademarks of their respective companies: HP, Hewlett-Packard LaserJet Series II, HP Vectra of Hewlett-Packard, QMS, JetScript, ASAP, Laser Connection of QMS, Inc. PostScript of Adobe Systems. IBM PC-XT, IBM PC-XT and IBM IPS/2 of International Business Machines Com.

S/2 of International Business Machines Corp.

CIRCLE 259 ON READER SERVICE CARD

1989 Laser Connection



COVER STORY

PC to Paper: Fax Grows Up M. David Stone/ The fax machine has changed the

way people do business. and the partnership of PC and fax promises to achieve more than either technology can offer alone. With streamlined software, enhanced performance, and improved communications func-



OPERATING SYSTEMS An Alliance of Convenience: DOS Under Unix

Kaare Christian/ Offering the best of two possible worlds, Locus Computing's Merge 386 and Interactive Systems' VP/ix make it possible to run the vast library of DOS applications under the powerful Unix operating system. How well do these products perform? Should you consider going this route if you need a multitasking operating system? Our reviews answer these questions and a host of others 149

Performance Tests 172

FEATURES

OPERATING ENVIRONMENTS The Truth About Presentation Manager Charles Petzold/ OS/2 is a

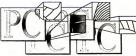
relatively new operating system, and its powerful graphical user interface, the Presentation Manager, is newer still. Appearing for the first time in OS/2 1.1, the Presentation Manager will make possible a new generation of PC software. But does its arrival mean that now is the time to make the move to OS/2? 187

ADD-IN BOARDS Add-in Boards for the HP LaserJet: Post-Purchase PostScript

Alfred Poor/ Don't lament your purchase of a LaserJet rather than a PostScript printer. With a PostScript add-in board from Conographic, Destiny Technology, Eicon Technology, OMS, or Princeton Publishing Labs. your LaserJet can do anything a PostScript printer can do-only

faster 205 Features Table..... 212

Performance Tests



The many shades of HP Laser.let add-in boards, page 205.

EDITORIAL PRODUCT INDEX

A list of products reviewed in this issue, plus a guide to utilities, programs, and tips in the Productivity section ... 396

Cover Photography:

15 systems tested here show

that PC-based fax packages are

coming of age-to the benefit

of PC users and businesses the

world over94

Features Table 102

Performance Tests 118

Thom O'Connor



A fax machine in every PC: the wave of the future? Page 94. project before, you're pro

over 7,500 words of advice

over 7.500 words of

project before, you

PRODUCTIVITY

FIRST LOOKS

Hands On:

- First Presentation Manager application: Borland's soupedup SideKick
- · SuperCalc5 handles multiple spreadsheets, adds optional
- 1-2-3-like interface · Core ships the first bus-
- mastering hard disk controller for the Micro Channel Redesigned PC Tools
- Deluxe: You name it, it's got it
- · Corel Draw!: Vector-based drawing package combines power and simplicity.
- Data Junction adds intelligence to database. spreadsheet file conversions
- CompuAdd 286-20 · Pizazz Plus stores screens in DTP formats
- · Vtune: Smart ASCII imports for Ventura Publisher33

AFTER HOURS

- · Quotron Open Windows gives you access to the stock info that the pros use
- · Andrew Tobias' Managing Your Money: How to make the most of what you've got · Andrew Tobias' Checkwrite
- Plus: A program for balancing your checkbook · Wealth Insurance: A look at

the financial future 406

PC LAB NOTES

The Attraction of PC MagNet

Gus Venditto/ Join the thousands of readers who have already been drawn to PC MagNet and log on to an easy way to download our utilities. Here's a glimpse inside our on-line service, and a quick note from each of the contributors..... 233

UTILITIES

Landscape Mode to the Rescue

Michael Holmes and Bob Flanders/ Save time and paper when printing out program listings and other ASCII files on your LaserJet printer. LASERLST puts two full pages of text on a

ENVIRONMENTS How to Move the TIMELINE Window

Charles Petzold/ Continuing to explore ways of using nonstandard windows in PM programs: here's an easy way to add your own moving logic to TIMELINE 281

POWER PROGRAMMING An Introduction to Indexed Files

Ray Duncan/ The pros and cons of different kinds of indexed files and file index structures are explained ... 291

SPREADSHEET CLINIC

Douglas Cobb and Steven Cobb/ Printing the current time in the header or footer of a Lotus 1-2-3 worksheet: calculating time in a SuperCalc

Eile Edit Formula Format Data

Ouotron Open Windows: on-line, real-time stock info for PCs, page 406.

PC MAGAZINE.....15

Joe Desposito/ Beef up a laptop cursor; an inexpensive blackand-white monitor27

VIEWPOINTS

LETTERS TO

PC ADVISOR

BILL MACHRONE What Can the Mac Teach

Us?.....65 JOHN C. DVORAK Dvorak's Hall of Infamy...71 Inside Track



macro features......319 LANGUAGES

POWER USER

USER-TO-USER

free memory with an

Neil J. Rubenking/ Maximize

alternative AUTOEXEC; a

batch file that displays your

Craig L. Stark/ Create your

WordPerfect 5.0's advanced

own pop-up menus using

computer's ID 313

Robert L. Hummel/ A quicker way to search text in BASIC: Turbo Pascal routines for creating your own editor; an automatic word-align function in Turbo Pascal 5.0 325

PC TUTOR

Robert L. Hummel/ Prevent batch files from ending prematurely; examine large files with DEBUG; produce the ESC character you need to issue ANSI commands 333

CONNECTIVITY CLINIC Frank J. Derfler, Jr./ Shortcuts for loading NetWare drivers for new networking cards; combining operating systems on the same cable isn't a problem; replacing a mini with a LAN...... 341

JIM SEYMOUR The /2nd Anniversary 77

WILLIAM F. ZACHMANN The OSF's CXI: A Thorn in IBM's Side 83

STEPHEN MANES Communications

Breakdown91

Direct Marketing	
Connection	345
Marketplace	372
Reader Service Card	397
Coming Up	399
Advertisers Product	
Index	.401
Index to Advertisers	405



Editor-in-Chief and Publisher Bill Machrone Associate Publisher J. Samuel Huey Executive Editors Bill Howard, Luisa Simone. Gus Venditto Workgroup Systems Editor Frank J. Derfler, Jr. West Coast Editor Lee Thé Senior Editor Mitt Jones Senior Technical Editor Tony Rizzo Senior Editor, Technical Columns Craig L. Stark Managing Editor Paul B. Ross Assistant Managing Editor Diane D'Angelo Manager, Copy Edit Linda Louk
Associate Editors Kellyn Betts, Robbin Juris, Trudy Neuhaus, Edward L. Perratore,
Donald P. Willmott Production Editor Karen A. Carter stant Production Editor Jeanne Albrecht Staff Writer Catherine D. Miller Staff Editors Glen Becker, Mary Kathleen Flynn, Jonathan Matzkin, Rock Miller, Sharon Terdeman, Jennifer Zaino Assistant Editors Elisa J. Hirsch, Stephanie K. Losee, Lonnie Lum, Michael W. Muchmore, Ann Ovodow, M. Stephanie Ricks, David Rosen, David M. Stanton, Juliann Sveda Editorial Assistants Alan Cohen, Lori Grunin, Susan L. Hayes, Stephanie Izarek, llona Price, Matthew J. Ross, Paula Seefeldt, P.J. Springer Proofreaders Joseph J. Antinori, Rink Murray General Business Manager Tom McGrade
Associate Business Manager Allen Wollman Assistant to the Publisher David Baker Administrative Assistants Christina Okano Freida T Smallwood Editorial Secretaries Donna Alfred, Anthony J. Giglio, Wendy Murch Secretaries Mark Miller, Susie Shuttleworth Database Assistant Dolores Williams Contributing Editors Frank Bican, Douglas Cobb, Steven Cobb, Ray Duncan, John C. Dvorak, Stephen Manes, Michael J. Mefford, Edward Mendelson, Charles Petzold, Jeff Prosise, oin Raskin, Winn L. Rosch, Neil J. Rubenking, Jim Seymour, Richard Hale Shaw, M. David Stone, Ethan Winer Manager, PC MagNet Christopher Barr Assistant Manager, PC MagNet Wendy W. Huang Editorial Liaison, PC MagNet Michael Cohn Sysop, PC MagNet Ross M. Greenberg Director, Design and Electronic Publishing Gerard Kunkel Art Director Jerry Tortorella

Associate Art Directors Charles Conover, Mariano Nicieza, Denise Platkin Senior Graphic Designer Laurie Wance Assistant Art Director Natalie Chu
Layout Artists Leigh Margerison, Yvonne Valdenegro
Graphic Artists Gary W. Kaplow, Gerard Sarrantonio Director, PC Labs John Dickinson Manager, PC Labs Bruce Freeman Senior Project Leader Joe Desposito
Senior Programmers Stuart R. Greenberg, Salvatore P. Ricciardi r 1953 Leauers Kooert W. Kane, Pamela J. Milland, Bill O'Brien, Philip F.H. Rose, I Network Manager Joseph F. Bizzo System Support Specialists Mario Baldasserini, Stephen W. Plain, Charles Rodriguez Inventory Control Manager John R. Delaney Inventory Control Technician Peter Bastide Project Leaders Robert W. Kane, Pamela J. Milland, Bill O'Brien, Philip F.H. Rose, Randol Tigrett PC Labs Coordinator Karen Williams Receptionist Janeen Collins Director, Marketing Kevin Russell Manager, Market Research Nicholas Andes Public Relations Director Jessica Kersey Public Relations Coordinator Stacy O'Connell Subscription Director Paul Stafford Single Copy Sales Director Robert Woltersdorf Production Supervisor Susan DePierro
Advertising Production Managers Michael Genzale, Vicki Egan Root
Advertising Production Assistants Wendy Mylett, Maryann Pritchet
Editorial Production Manager Dennis Fitzgerald
Editorial Production Coordinator Melissa Maurer Production Systems Supervisor Linda Harms
Production Systems Staff Melvin Foster-Poetsch, Charles Milburn

Group Vice President William Lohse

Advertising Office One Park Ave., New York, NY 10016, (212) 503-5100

Editorial Director Paul Somerson

ZIFF-DAVIS PURI ISHING COMPANY

esident William Lobse Group Vice Presidents William Lohse, J. Scott Briggs

Group Vice Presidents William Lohse, J. Scott Br Senior Vice President, Marketing Paul H. Chook Vice President, Operations Baird Davis Vice President, Production Roger Herrmann Vice President, Controller John Vlachos Vice President, Controller John Vlachos Vice President, Creative Services Herbert Stern Vice President, Research Marian O. White Vice President, Circulation Bert Lacy Vice President, Circulation Services James Ramaley

Vice President, Marketing Services Ann Pollak Adelman Vice President, Classified Advertising Alicia Marie Ivans Vice President, Development Seth Alpert Director of Planning Gary A. Gustafson Production Director Walter I. Terlecki

ZIFF COMMUNICATIONS COMPANY

m William B. Ziff, Jr. Vice Chairman Philip B. Korsant President Kenneth H. Koppel Executive Vice President Stephen C. Kabier Senior Vice Presidents Philip Sine, Hugh Tietjer Vice Presidents Donna Dorn, Steven C. Feinm J. Malcolm Morris, William Phillips Secretary Bertram A. Abrams

HOW TO CONTACT THE EDITORS

The editors of PC Magazine want to hear from you. Con questions, and, of course, compliments should be sent by letter to One Park Ave., New York, NY 10016—it's probably the best way to reach us. You can also reach us electronically via MCI Mail (our account number is 157-9301) or by leaving a note on PC MagNet when you've finished downloading the latest utility. If nothing but a buman voice will do, call us at (212) 503-5255.

We are unable to look up past stories, recommend products, or diagnose problems with your PC by phone. If you bought a product advertised in PC Magazine, are dissatisfied, and can't resolve the problem, write (do not call) Michael Gratzon, Advertising Depart-

ment, at One Park Ave. Include copies of correspondence.

PC Magazine is under no obligation to review unsolicited products. All submissions accepted for publication become the property of PC Magazine

PC MagNet, an on-line service, is a source for PC Magazine's utilities (both programs and source code), the PC Labs Benchmark Test programs, and an index of articles printed in the magazine. Callers can upload submissions to PC Magazine's Productivity section and orums to discuss articles printed in PC Magazine with the authors and other readers. PC MagNet provides electronic mail and a gateway to CompuServe. For more information see the Productivity section or call (212) 503-5108

PERMISSIONS REPRINTS

Material in this publication may not be reproduced in any form with-out permission. If you want to quote from an article or use PC Maga-zine's logo in conjunction with an Editor's Choice designation, write Jean Lamensdorf, Licensing Director, for information on reprints, write Jennifer Locke: Ziff Davis Publishing Co., One Park Ave., New York NV 10016

SUBSCRIPTION QUESTIONS

If you want to subscription or PC Magazine, if you have a question about your subscription, or if you're moving, call or write: PC Magazine, P.O. Box 54093, Boulder, CO 80322; (303) 447-9330. A 1-year subscription (22 issues) costs \$44.97. Canada and foreign: add \$37.00 per year. New subscriptions and address changes take 6 to 8 weeks to process. For back issues, write Felicia Hunter, Back Issues Department, PC Magazine, P.O. Box 5999, Cherry Hill, NJ 08034. Send \$8 per issue (check or money order, \$9

Editorial and Business Office: One Park Ave., New York, NY 10016. Editorial (212) 503-5255, Advertising (212) 503-5100. PC Magazine in an independent journal, not affiliated in any way with international Busi-ness Markines Corporation. IBM is a registered tradermark of international ess Office: One Park Ave., New York, NY 10016. Business Machines Corp. Entire contents Copyright © 1989 Ziff-Davis Publishing Co., a division of Ziff Communications Co. All rights re-served; reproduction in whole or in part without permission is prohibited. The following are trademarks of Ziff Communications Co., PC, PC: The Independent Guide to IBM-Standard Personal Computing, PC Magazine, PC Mart, PC Labs. PC-Communiqués, PC Tutor, User-to-User, Power

User, Power Programming, Spreadsheet Clinic, The PC Utilines, PC Lab Notes, PC Advisor, First Looks, PC Pipeline, PC MagNet.





Get VGA graphics resolution on any EGA with au monitor for AutoCAD. Windows and Ventura Pub

Change fonts, colors and screen sizes in pop s like WordStar & Word Perfect. 80 × 60 s Announcement:

We interrupt our regularly scheduled advertising to bring you these messages (posted on the CompuServe electronic bulletin board by users of UltraVision).

"I am simply speechless at the amazing program you guys have produced. It has bad a greater impact on my daily computer use than any other program I have ever used. I am now almost

constantly in 60 line mode." "A brilliant piece of software! Does everything it claims to do."

"I recently got 3 UV hits and have 12 more on order. In my bumble opinion, it is one of the best products to bit the PC scene in the last couple years"

"Anyone with an EGA should get Ultravission".

"Better resolution than any PS/2. Congratulations on a truly fantastic product"

"The cost savings (not to mention the better quality text) over a VGA is a public portrice."

"The increase in speed with Ultravision was immediately noticeable. Two to three times faster.

"This is one of the few products I have purchased for my PC that was worth the money Thanks."

way write code or review

rs like Brief, 120 × 43 shown.





Fastback Plus. Run serminal et like VTERM with 132 columns

scrolling left and right.

Supercharge your EGA

Introducing UltraVision " software that turns your EGA into a state-of-the-art display. You get more bells and whistles than the latest video cards, without replacing your current hardware.

Goodbye, drab colors.

Was your favorite application designed by a color-blind programmer? No problem. We've unlocked the full 64-color EGA palette so you can change screen colors to make any application look just the way you like.

Put on a new face.

You'll love the way our new typefaces look on your screen. Choose from a library of styles

including Sans-serif, Courier, Script. or novelty styles like I'm antwer, Data and Old Entitish. Change styles in a flash.

Stop scrolling around.

UltraVision comes with a special Booster Card that plugs into the feature connector on your EGA. Now you can see more and scroll less in a host of popular applications. Choose screen dimensions up to 132×43 .

UltraVision looks great on standard EGA monitors, and it gives you even more on autosync displays, like VGA-quality graphics and super high resolution character definition. Give your eyes a break. Your world will look a whole lot better.

UltraVision is from the makers of SeeMORE " SmartNotes" Look & Link " and @BASE" UltraVision for VGA and plasma displays coming soon.

copies of UltraVision at \$119.95 each. Include \$3.75 shipping per order. (\$12 outside USA and Canada). Mass, residents add 5% sales tax.

Payment: ☐ VISA ☐ MC ☐ AMEX

☐ DINERS ☐ CHECK

CARD EXP DATE NAME

TUUBECC STATE

> To order, send coupon or call toll-free. Company PO's accepted by mail or fax. 800-445-3311

63 Great Road, Maynard, MA 01754 508-897-1575 FAX 508-897-1947

These unretouched photos demonstrate how UltraVision improves character resolution on any EGA with autosync monitor. Normal EGA characters are defined in an 8 × 14 matrix versus 9 × 19 for UltraVision.

Winning Combination ... The Performance, Aggressive Prices and On-Site Service!





PC MAGAZINE, EDITORS CHOICE JANUARY 31, 1989 SAYS,

"In short: Austin Computer Systems has a winning combination of classy parts, smart design, high performance, and aggressive pricing, all backed by a GE onsite service contract. How can you lose?



Austin 286/12.5 Cache

10 MB 11 \$2195 20 MS 11

20 MB 11 \$2195 40 MS 11 \$2295 # MB 11 \$2595 \$2396

- Intel 12.5 MHz 80286 Processor
 Shadow Ram Caching (BIOS)
- Shodow Ram Caching (BIOS Caching) 49 MB 1: Fast Access Hard Drive 29X Hard Disk Cachi Hi-Po Disk Caching Grive Caching Carrie Contract 47 EAD Display Monitor Paradise EEGA Autoswitch Display Adonte:

- Adapter

 1 Full MB of Rem
 Expands to 4 MB on Board,
 16 MB Total
 16 MB Total
 2 EMS LIMN
 Dust Pioppy
 Harddask Controller
 Americal MB or 50% 1.2 MB Hoppy
 Disk Drives
 Disk Drives
- Phasems BUS
 Keytronics Enhanced 101 Keybaard
 Swird Norce & L Parallel Port
 L PS 2 Marse Dort
 Clock, Marse Dort
 Clock, Marse Dort
 Clock, Mark Buttery Backup
 Math Co-Processor Socket
 FC Class B Approved
 FC Class B Approved
 Marse & Technical Reference
 Marsel

 - Mariual

 Diagnostic & Utility Programs

 Fully DOS & OS 2 Compatible

\$249500 VGA



Austin 286/20 Cache

- dard Features:
- · 80286 Processor running @ 20 MHz
- Hi-Po Disk Caching Software
 Shadow RAM Caching
- 26 MHz Performance Rating (LandMark)
 1 MB of RAM on Board
- GE 1 Year On-Site Service Contract
- 40 MB 1:1 Fast Access Hard Drive
 14° VGA Color Monitor

- 14° VGA Cotor Monator
 VGA Analog Display Adapter
 American-Made MotherBoard
 Small Footprint Chassis
 Dual Floppy/Harddisk Controller
 3.5° 1.44 MB or 5¼° 1.2 MB Floppy Disk Drive
- Keytronics Enhanced 101 Keyboard

- 2 Serial Ports & 1 Parallel Port
 Clock with Battery Backup
 80287 Math Co-Processor Support
 Users & Technical Reference Manual

 Built-in Setup & Diagnostics Program
 Fully DOS & OS/2 Compatible Complete VGA Color, 40MB System

\$269500



Austin 386/SX

- Standard Features:
 True Intel 80386 SX Processor
 MB of 32 Bit RAM on Board
- GE 1 Year On-Site Service Contract 40 MB 1:1 Fast Access Hard Drive
- Hi-Po Disk Caching Software
- 14" VGA Color Monitor
- VGA Analog Display Adapter
 American-Made Motherboard
- Small FootPrint Chassis
 Dual Floppy/Harddisk Controller
 3.5* 1.44 MB or 5½* 1.2 MB Floppy Disk Drive
- Keytronics Enhanced 101 Keyboard
 Serial Ports & 1 Parallel Port
- 2 Serial Ports & I Parallel Port
 Clock with Battery Backup
 80387 Math Co-Processor Support
 Users & Technical Reference Manual
 Built-in Setup & Diagnostics Program
 Fully Unix & OS/2 Compatible

Complete VGA Color, 40MB System as above

\$279500



Austin 386/20 Cache Standard Features: • True Intel 80386 Double Sigma Pro-

Frue Inter 80386 Double Signa Pro-cessor running at 20 MHz
 64K Static RAM Cache @ 35 Nano's

- Hi-Po Disk Caching Software
 30 MHz Performance Rating (LandMark)
 14° VGA Color Monitor
- VGA Analog Display Adapter
 80 MB 1:1 Fast Access Hard Drive
- GE 1 Year On-Site Service Contract
 1 MB of 32 Bit RAM on Board Expands on 8 MB/32 Bit RAM on Board
- on a Maria RAM on Dauru 1-32 Bit, 6-16 Bit, 1-8 Bit Slots American-Made MotherBoard 5 Bay DeskTop Chassis Dual Floppy/Harddisk Controller *3.5* 1.44 MB or 5%* 1.2 MB Floppy
- Disk Drive Keytronics Enhanced 101 Keybo 2 Serial Ports & 1 Parallel Port Clock with Battery Backup
 80387 Math Co-Processor Support
- Users & Technical Reference Manual
 Built-in Setup & Diagnostics Program
 Fully Unix & OS/2 Compatible

Complete VGA Color, 80MB System

\$399500



Austin 386/25 HyperCache Standard Features: • True Intel 80386/25 Processor running at

- 128K Static RAM Cache @ 20 Nano's Shadow RAM Caching (Bios Caching)
 Hi-Po Disk Caching Software
- 42 MHz Performance Rating (LandMark)
 14° VGA Color Monitor
- VGA Analog Display Adapter
 80 MB 1:1 Fast Access Hard Drive
 GE 1 Year On-Site Service Contract • 1 MB of 32 Bit RAM
- Expands to 16 MB/32 Bit RAM 1-32 Bit High Speed Memory Slot 2-32 Bit Intel Standard Slots and 4-16 Bit slots (usable as 8 Bit)
- American-Made MotherBoard
- 5 Bay DeskTop Chassis
 Dual Floppy/Harddisk Controller
 3.5* 1.44 MB or 5¼* 1.2 MB Floppy
- Disk Drive Keytronics Enhanced 101 Keyboard
- Keytromics Enhanced 101 Keytouard
 Serial Ports & 1 Parallel Port
 Clock with Battery Backup
 80387 & Weitek Math Co-Pro Support
 Users & Technical Reference Manual · Built-in Setup & Diagnostics Program Fully Unix & OS/2 Compatible

Complete VGA Color, 80MB System

\$599500

low Can You Lose?" You Extremely High Performance! 30 days for a full refund on the hard-

Memory Caching, Shadow RAM, Integrated I/O, and Fast Access Hard Drives make our systems scream along . . . But we don't stop there! All Austin computers include 16 bit Video Adapters, the fastest available: 1:1 or ESDI Hard Drive Controllers to ensure the fastest access possible; and a Hard Drive Caching Program so good that PC Magazine voted it the best in its class for 1988!

With the Fastest RAM, the Fastest Video, and the Fastest Hard Drives, you get a system that simply can't be bassed up!

American Made Quality Austin Computers, including the

motherboards, are made and assembled in the USA! The latest design and manufacturing techniques allow us to offer the highest quality products at low prices!

A World Class Support Program Featuring . . . GE Computer Serv

GE On-Site Service A Full One Year On-Site Service Contract from GE Computer Services is included with every Austin computer. Should your system fail, a GE technician will come to you and resolve the problem . . . Usually within 24 hours! Extended 2nd-5th year contracts are available.

Unlimited Toll-Free Support If you require assistance for any

reason, call our Toll Free 1-800 number. Our highly trained support personnel are available six days a week. 30 Day Money Back Guarantee

If you're not satisfied for any reason, just return your system within

ware price.

Fully Loaded Systems We configure every Austin computer to include a Monitor, Video Adapter, Hard Drive, Floppy Drive, Keyboard, and a full array of I/O ports.

If you desire a custom configuration, or additional options, just tell our sales personnel how you want it! Most orders are

prepared for shipment within two days.

Exceptional Pricing! Performance, Support, Quality, and Features that you demand, at prices you won't believe!

No other system has it all . . . DeskDrive one today!

	Hard-				
Monstor	drive	286/20	386/SX	386/20	386/2
VGA	40 MB	\$2495	\$2595	\$3495	\$5493
Mono-	80 MB	\$2795	\$2895	\$3795	\$5795
chrome	1 STA	\$3096	\$3195	\$4095	\$6093
- Jane	TE ATT	\$3295	\$3396	\$4395	\$6395
	40 MB	\$2,65	\$2735	\$3795	\$5795
VGA Color	11	\$2596	\$3195	\$3995	ES94
	TO MR	\$3296	\$3395	\$4295	\$6290
	IS ME	\$3495	\$3595	\$4595	\$659
PRO	1.1	\$2895	\$2995	\$3895	\$5995
VGA	11	\$3196	\$3395	\$4195	\$6290
Color	110 MR	\$3496	\$3595	\$4495	\$6495
	TEC MIN	\$3695	\$3795	\$4795	\$6795

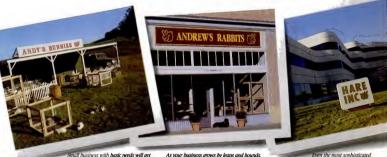
1-800-752-1577



7801 N. LAMAR - SUITE E-198 AUSTIN, TX 78752

IBM, AT, OSZ, AND PSZ ARE TRADEMARKS OR REGISTRED TRADEMARKS OF THE IBM CORPORATION, OTHER BRANDS AND PRODUCT NAMES ARE TRADE MARKS OR REGISTRED PRADEMARKS OF THE SEPECT. THE ROLLER'S PRICES AND SPECIFICATIONS ARE SURECT TO CHANGE WITHOUT WORKE, COLL CREARS, LELECTER CORPORATION.

ccountin histic



Small business with basic needs will get off to a jack-rabbit start with ACCPAC® Easy

As your business grows by leaps and bounds, move up to ACCPAC BP!

Even the most sophisticated breed of business is handled by ACCPAC* Plus.

Sales volume. Market share. Percent increase over prior year.

The simple truth is, the business of business is to grow.

The sad truth is, most accounting software can't handle that. Built-in obsolescence often seems to be a standard feature.

Which is one of the most compel-

ling reasons to consider the ACCPAC® line of accounting software. Because it is precisely that: a line. A smooth, efficient path for expansion. Allowing you to transfer data when you trade up.

The starting point is ACCPAC Easy, our primer. Offering "excellent audit trail features," according to

g Software ated It Even Multiply.

reviews in *Software Digest*.

And here's where you trade up to: our five module workhorse, BPI Accounting. With power and flexibility that let you tailor systems to your way of working. PC World calls its intuitive interface "the most hospitable," while naming BPI "an outstanding value."

Finally, for the largest networks or most specific requirements, there's our powerhouse, ACCPAC Plus. With a complete range of fullfeatured modules. And pre-

designed, off-the-shelf solutions for a wide variety of businesses. Rated "best in its class" by *InfoWorld*, Plus offers the ultimate in control.

And we offer even more. The stabil-

ity and support that come from the world's leading independent software company. Offering the broadest line available. Letting you work in MS-DOS or OS/2, then graduate to a local area network without replacing software.

But when you do upgrade, we protect your investment in staff training

and data. Even giving you significant rebates for the ACCPAC software you already own. Call 1-800-531-5236. In Canada call 1-800-663-6904.

We'll tell you more about ACCPAC, our rebate program and what we can do for your

business. Namely, help it grow.



© 1989 Computer Associates International, Inc. 1240 McKay Dr., San Jose, CA 95131

CIRCLE 102 ON READER SERVICE CARD

Of the more than 250 hardware products reviewed by InfoWorld in 1988, our CompuStar, received the highest total score awarded.

CompuStar.



See us at

See us at

April 10-13, 1989

April 10-13, 1989

McCormick Place
Chicago, Illinois
Booth 8670's

Simply stated, it's number one.

CompuStar. is the world's first and only multi-processor, convertible bus™ microcomputer. It can be configured with up to 13 bus expansion slots (PS/2 and/or PC/AT compatible), your choice of interchangeable 8086, 80286, or 80386 microprocessors and up to seven disk/tape devices.

To receive a reprint of the InfoWorld review, as well as a complete CompuStar product information kit, call 803/796-7800.



LETTERS TO **PC MAGAZINE**



COMPARING APPLES AND IRMS

I can't believe Jim Seymour gave the Apple LaserWriter IINTX his endorsement ("The Best of 1988" PC Magazine, January 17, 1989). It is a great printer, but only for Mac users and PC users with AppleTalk (a.k.a. LocalTalk) boards. Like the original LaserWriter, it doesn't even have a parallel port, which is Apple's backhanded slap at anything IBM.

Steve Roth Seattle. Washington

THE NEXT WAVE IN PUBLISHING?

Bestinfo should not be mentioned in the same breath as desktop systems ("Power Publishing," PC Magazine, December 27, 1988). Bestinfo does not compete with



them; it competes with companies like Atex, Penta, and Xyvision.

Perhaps it is useful in discussing Bestinfo to eschew the term "professional desktop system" and use the term Fourth Wave publishing system. The Fourth Wave, as described by the Seybold Report. stands for a new generation of systems that perform functions on mainstream platforms instead of expensive proprietary platforms.

> Jim Bessen President and CEO Bestinfo Inc. Media, Pennsylvania

LOOKING BACK, LOOKING AHEAD

Your end-of-the-year issue was great. The millennium has arrived: John Dvorak rightly labeled the AT bus an "old zombie," and PC Magazine recognized that the Micro Channel bus is a genuine technical advance-not just a marketing ploy. I loved it!

Peter H. Strong Los Angeles, California

ENTERTAINING DVORAK

John C. Dvorak's critique of certain IBM employees' social graces, followed by his comments about SAA ("My Dinner with IBM." PC Magazine, January 31, 1989). raises questions about his objectivity. What does it take to favorably impress a computer columnist? I am not a big fan of many of IBM's recent actions and I agree that IBM is not the best business entertainer in the industry, but so what?

It is not their business, nor that of any other vendor, to entertain computer columnists. Would Dvorak's stated dislike of the Micro Channel architecture and IBM itself have been mollified by a good steak. a bottle of wine, and pleasant conversation (all free, of course)?

Mark Tucker East Montpelier, Vermont

I do not always agree with John C. Dvorak, but I must say that he was correct in his observations on IBM. Most IBM employees do have more class and tact than those Mr. Dvorak encountered at dinner. But, in Big Blue's drive for greater profits, a school of thought has formed in the heart of its market-driven management that puts little value on personal relationships. Instead, getting the job done, regardless of cost, is the first priority.

These people have either forgotten, or were never taught, that professional etiquette begins with personal etiquette. Not only is it an honor and a privilege to have the mealtime company of another, but it is the obligation of the party extending the invitation to pick up the tab. There is a difference between playing hardball like a sportsman and playing hardball like a prima donna athlete. Some of the people who work for IBM should be sent down to the minor leagues.

David N. Heller Reston, Virginia

STRAIGHT TALK ABOUT DRIVES

Your writers communicate valuable information in a most effective manner. I needed to know more about the hard disk drive in the Model 30 286 ("What's Old Is New," PC Magazine, January 17, 1988). and your article contained all the information I needed and then some.

George E. Remp, Jr. Upper Darby, Pennsylvania

WHY NOT SHAREWARE?

I feel you committed a great injustice by not mentioning shareware in your list of awards and kudos

("The Best of 1988"). Not everyone requires the ultimate product from some distant software house that cannot or will not support the user. For most

of us, shareware is an excellent route to greater productivity.

James R. Plosay

Monterey, California

ZvINDEX 3.0 is the only full text retrieval program that:

- · retrieves vital information from 20 mbytes of files in 5 seconds
- · works with 20 popular WP programs plus Dow Jones, Compuserve, ASCII, Lotus 1-2-3
- · offers major LAN compatibility
- comes in 3 versions from \$95 to \$695, according to your needs

More than a text retrieval program, ZylNDEX will actually change the way you manage information. For free demo diskette, call:

1-800-544-6339

3105-T North Wilke Road Arlington Heights, IL 60004 FAX 312-632-1129 Phone: 312-632-1100 CIRCLE 316 ON READER SERVICE CARD © 1989, ZyLAB Corp.

I LETTERS

TIARA LANCARD DESERVES BETTER I can't believe the short shrift Frank

Derfler gave the Tiara LanCard E ("Building Workgroup Solutions: Ethernet

Cards," PC Magazine, January 31, 1989). The 8-bit LanCard is the throughput equal of the fastest 16-bit board. Its degradation from zero to four stations is a remarkable 7 per-



any other 8-bit card with zero stations. Michael Friedlander

Ossining, New York

CLIPPED AGAIN?

Bill Machrone's kudos for the Curtis Clip were premature ("The Best of 1988," PC Magazine, January 17, 1989). There's no spring in the clip, so after you've tucked a couple of sheets of paper under it a couple of times, single sheets fall off. And, of course, the more sheets you use each time, the more it needs the next time.

This product is another example of American marketing: build it, hype it, and sell it. Let the public discover that it doesn't work. By then, the company's been bought out and the executives have floated to their Caribbean cabanas on platinum parachutes.

> Ron Rodriguez Lafayette, California

SEND ME A LETTER

What's all the fuss about printing envelopes on a LaserJet ("Printing the Perfect Envelope," PC Magazine, December 13, 1988)? Why all the ink for special programs and utilities?

I use a Wang PC and a LaserJet to print #10 envelopes and have never had a problem. I position the cursor on the first letter of the inside address and Enter GL + E. The macro picks up the inside address, drops it on the last page of the document, adds the correct number of returns to position the copy, and prompts me to change the left margin to 70 when printing. Perfect every time.

> Peter Obletz New York, New York

NON-TECHIES NEED HELP, TOO

Although your magazine contains very useful information. I feel that some of your articles tend to assume that the reader is already a technical expert on the topic under discussion. I would like to be able to gain new information from your articles, not just enhance my existing knowledge.

Lori Trawick Montgomery, Alabama

CONNECTIONS GET YOU SO FAR

The two-edge connector board issue sounds like a nightmare to John C. Dvorak ("EISA Come, EISA Go!" PC Maga-

 The Wells modular system is a quantum leap in hardware refinement, taking removable backplane technology in desktop publishing to its logical conclusion.

zine. December 27, 1988), but unless I must plug and unplug a board each time I boot up my computer, I'm not going to worry about it. In the 2 years that I've had my AT system. I've only opened it twice and unplugged a board once.

Why doesn't Mr. Dvorak design and produce his own board, and we'll see who follows him?

> Rick Carlson Meriden, Connecticut

I DON'T DO WINDOWS

Stephen Manes really hit home ("New Versions, Old Pains," PC Magazine, October 11, 1988). Most so-called upgrades now favor windows. This is fine for illiterates, but when one learned computing with only 16K of BASIC and 16K of RAM, a window is wasted memory. I'll stick with my uncluttered screen.

Walt Stevenson Pittsburg, Kansas



Issuance of common stock
Issuance of preferred stock
Total sources

Uses of working capital: Additions to fixed assets

Additions to other assets

screase is working capital

Dividends paid on capital stock Total Uses



Look&Link

With dynamic linking you can build giant 1-2-3 applications and you'll never run out of memory. Values from linked sheets automatically feed into the primary sheet.

Boundless Worksheets.

\$125,639

\$106,834 \$38,764

\$254.674

LOOK & LINK 10 for 1-2-3 $^{\circ}$ Release 2 lets you build applications that span across worksheets. You get dynamic linking and consolidation plus the ability to see two sheets on the screen at the same time.

Be in two places at once.

Have you ever wanted to look at one worksheet while using another? Now you can. A special pop-up window lets you see a second worksheet with the push of a key.



You can scroll up, down, left or right, move and resize the window, swap sheets between windows, and cut and paste between sheets. And that's just the beginning.

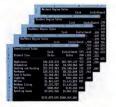
Build multi-sheet applications.

With LOOK & LINK, any worksheet can pull information out of other worksheets on disk or expanded memory (optional). You might link a 1040 tax worksheet to its supporting schedules.

Link a cell or a range. Link values or summary information. Perform table lookups. It's easy — move the cursor in the pop-up window to define the link cells.

Consolidate many sheets into one.

LOOK & LINK also does automatic consolidations, complete with audit trail. You might sum twelve monthly P&Ls to create an annual report or sum



regional sales worksheets to produce a national consolidation.

LOOK & LINK is from the makers of @BASE™, SeeMORE™, SmartNotes™ and UltraVision™ for the IBM PC and compatibles.

Look&Link

Please send r

copies of LOOK & LINK at \$99.95 each.
Include \$3.75 shipping per order. (\$12 outside USA and Canada). Mass. residents add 5% sales tax.

CARD# EXP. DATE

NAME

ADDRESS PHONE

STATE ZIP
To order, send coupon or call toll-free.
Company PO's accepted by mail or fax.
800-445-3311

personics

63 Great Road, Maynard, MA 01754 508-897-1575 FAX 508-897-1947

Hardware, Software, Any-

Software		Graphics		Hardware*		Emulation Boards		
Word Processing/		Design CAD	\$159	Computers		AST 5251-11+	\$	575
Desktop Publishing		Diagraph	\$259	AST Premium 286-080	\$1475	IRMA II PCA/MCA	\$	725
Ami'	\$ 99	Lotus Freelance Plus	\$329	Samsung S550 40MB	\$1475	Monitors		
Lotus Manuscript	\$339	Gem/3 Presentation	\$289	w/EGA card	\$1750	Amdek 410A	\$	149
Microsoft Word	\$229	Generic CADD III	\$139	Toshiba T1600 laptop	\$3750	AST EGA Display		489
Multimate Advantage II	\$269	Graph Plus	\$319	Toshiba TTood laptop	\$57.50	AST VGA Display		489
Office Writer/Speller	\$259	Master Graphics	\$299	Multifunction Boards		NEC Multisync II		629
Pagemaker 3.0	\$499	Micrografx Designer	\$449			Princeton HX-12 +		439
PFS:Professional Write	\$119	Harvard Graphics	\$279	AST 6 Pak Plus (64k)	\$ 129	Samsung Color		239
Publisher's Type Foundr		MS Chart	\$269	Advantage 286 (512k)	\$ 375	Samsung Monochrome	Ś	89
SPF/PC	\$159	PC Paintbrush Plus	\$ 79	Rampage + 286 (512k)	\$ 519	cameang menesment	•	-
Sprint	\$129	Picture Perfect	\$199	Rampage +/MC (512k)	\$ 519	Printers/Plotters		
Ventura Publisher	\$469	Publishers Paintbrush	\$149	Inboard 386AT	\$1129	Epson FX-1050	\$	529
WordPerfect 5.0	\$229	Project Management		Inboard 386PC	\$ 775	Epson LQ-500		379
Wordstar Pro 5.0	\$249	Adv.Proi.Mgr. Wkbench	\$819	Intel AboveBoard Plus	\$ 439	Epson LQ-1050		829
Wordstar 2000+ 3.0	\$259	Harvard Total P.M.II	\$429	intel Abovebbala Flus	4 400	Epson LQ-2550		1050
Xvwrite III Plus	\$219	Microsoft Project 4.0	\$329	Display Boards		H-P 7475A Plotter		1475
Aywrite III Flus	\$215	Superproject Expert	\$449	AST VGA	\$ 259	H-P Deskjet		750
Database Systems		Timeline 3.0	\$389	AST VGA Plus	\$ 349	H-P Laseriet II		1795
Clipper	\$449		4009	ATI EGA Wonder x 800	\$ 259	Okidata 320		375
DBase IV	\$479	Languages/Utilities		Paradise VGA Plus	\$ 289	Okidata 321		519
DBase IV Devel.Edition	\$799	Fastback Plus	\$105	raradise VGA Flus	\$ 209	Okidata 393		1050
Dataease 4.0	\$449	Norton Advanced	\$ 79	Modems		Panasonic 1080i		199
DataPerfect	\$309	Microsoft C	\$299	Hayes 1200/1200B	\$ 299	Panasonic 1091i		229
Foxbase Plus	\$189	Mace Utilities	\$ 65	Hayes 2400/2400B	\$ 449	Panasonic 1124		339
Paradox 2	\$479	MS Fortran 4.0	\$299	Intel 2400B/2 (PS/2)	\$ 279	Toshiba printers	*	call
PFS:Professional File	\$179	Quick Basic/Quick C	\$ 69	Practical 1200 Internal	\$ 79			•
R Base for DOS	\$469	Turbo Basic	\$ 65	US Robotics 2400B	\$ 159	Mass Storage/Backup Bernoulli II Dual		
		Turbo Pascal 5.0/		Ventel 2400/2400B	\$ 389	Irwin Tape drives	\$	1750
Spreadsheets/		Turbo C	\$ 99	Ventel 2400/2 (PS/2)	\$ 299	Mountain 40MB		call
Integrated Packages	e 00	Turbo Pascal Prof/C Prof				Int.Tape		200
Allways	\$ 89	Vaccine (anti-virus)	\$ 99	Networking			\$	389
Lotus 1-2-3	\$309 \$269			Arcnet Board SMC	\$ 149	Plus Hardcard 20 Plus Hardcard 40		525 669
Lotus Agenda	\$ 99	Accounting		Novell Adv. Netware 286		Seagate ST251-1	\$	469
Lotus Hal	\$ 79	DacEasy	\$ 69	2.12	\$1950			
Lucid 3-D		Great Plains	\$499	Novell ELS Level I	\$ 450	Seagate ST225 w/int.	\$	289
Microsoft Excel Microsoft Works	\$259 \$109	Peachtree Complete III	\$159	Tops for DOS	\$ 119	Seagate ST238 w/int. Sysgen Bridge w/int.	\$	319 299
Q&A	\$209	ATTENTION	CODE	DODATE DUVED	C.		*	299
Quattro	\$149	AITENTIUN	LUKI	PORATE BUYER	5 :	Input Devices		
Smart System	\$449	- Aleranti	27			Complete Hand		
	\$329			SIMILE ORDER SYST		Scanner	\$	169
Supercalc 5 Lotus Symphony	\$459	[7]	18) 438	1-2315 or (718) 972-83	46	Keytronics KB101		
	\$409	JAU -				keybrd	ş	99
Communications		Your Corporate Purch.	ase Orde	r is guaranteed priority hand	1-	Logitech Hi-Rez Mouse		99
Carbon Copy +	\$119			exclusive SOFTLINE FAXP		Logitech ScanMan	\$	
Crosstalk XVI	\$ 99			ind other communications w	ill	Microsoft Mouse	\$	109
Crosstalk MK4	\$125	also receive prompt at	tention.			PC Mouse w/Paint	\$	99
Procomm Plus	\$ 59	ATTENTION	UTED	NATIONAL BUYER	c.	Accessories		
Relay Gold	\$169	ATTENTIONI	VIEN	WATIONAL BUTER	13.	Curtis Ruby	\$	59
Smarterm(Persoft)	call	1/ORDITE	51 GL	DBAL ORDER SYSTEM		Datashield S-100	\$	69
Smartcom III	\$149	201) () 1 1	⊃ະ 627	7-30170 or 910-240-39	18	Isobar 4-4	\$	49
01-11-11		Int'l Fax I		18) 438-2315 or 972-83		Logical Connection		
Statistics CSS 2.1 with graphics	\$369	III I. FAX I	11169 (1	101-400-2010 01 972-00	40	(256k)	\$	499
SPSS/PC+	\$675	SOFTLINE TELXPEDIT	E insure	s prompt response for all yo	ur	Masterpiece Plus	\$	125
Statgraphics 3.0	\$569			may be made by bank check		256k Ram set		call
Systat 4.0/w/	4309			a. Goods are shipped via Air		8087 math chip		119
	19/679			ders) or Air Frieght. Add frei	ight			/299
-,0	101019	costs to prepayment, o	r goods a	are shipped freight collect.		80387-16/80387-20 \$4	159	/519
Desktop Environments					11	*Call for shipping cost		
MS Windows 286	\$ 69							
Sidekick Plue	¢120							

Celebrating 6 Years of Service



In New York State and Int'l. Call [718] 438-6057

TELEX: 627-30170 or 910-240-3918

where.

Delivers!

winners at super low prices!

XYWRITE III +







FOXBASE PLUS



\$189

VENTURA PUBLISHER



HP LASERJET II



\$1695

- HARDCARD

20 Meg -\$525 40 Meg \$669

FREE TEE!



Ask for one of these great PC MAGAZINE tee shirts when you place your order.

A \$10 value, it's FREE with your order of \$500 or more, while supplies last!



\$1475 (1/12/88)

HARVARD GRAPHICS



1-800-221-126



Brooklyn, NY 11219 TELEX: 627-30170 or 910-240-3918 FAX: (718) 438-2315

IME: All returns require prior authorization - 20% restocking fee on returns - PD's accepted from qualified organizations - Visu or Mastercard add 3% - C.O.O., Cash, Money order or bank check only - add \$5.00 per order paid company or personal check - allow 2 weeks to clear - Shipping via UPS surface - add \$5.00 per item, UPS Blue - add \$12 per item - All prices subject to change, call for current prices - Int1 - freight additional.

Introducing the world's first cellular computer.



Now cellular communication is more than just talk.

G et all the power of portable computing and the convenience of cellular communications too. Meet the ITC 286 CAT from Intelligence Technology Corporation. It's two technologies in one efficient package, ready to work at a remote jobsite or an office downtown.

Omce downtown.

This unique patented portable offers fail-safe transmission. The built-in cellular telephone and error-correcting modern let you trust valuable data to the cellular network — even during hand-off and channel changes.

And it provides more than 2 hours of battery-powered operation, automatically converting to 110/220V or to 12V for in-vehicle use. Batteries can even be recharged during operation.

The ITC 286 CAT is IBM PC/AT-compatible and features 12 MHz processing, 640K memory,

a high-speed hard disk drive, a high-resolution EGA screen, full-size keyboard and more. The numeric keypad and built-in speakerphone simplify your voice and data calls. A headset and cellular telephone handset are included for more versatility. And it all comes in an easy-to-carry case.

For a complete workstation just take along a portable printer. Or connect with other ITC 286 CATs for an instant mobile LAN. It's a brand new way to keep your company on the move.

If you thought cellular communications was all just a lot of talk, we invite you to hear and see more about this technological merger. ITC made a remote possibility reality. For details call: 1.800-336-3493.



Intelligence Technology Corporation 16526 Westgrove, Dallas, TX 75248 U.S.A. 214-250-4277, FAX 214-380-0508

©1989 Intelligence Technology Composition, ITC 286 CAT, Patent Pending, IRM PC/XT/AT are resistened trademarks of Internation

■ LETTERS

THE MISSING AMERICAN

I am very surprised at your choice of top desktop system ("5th Annual Awards for Technical Excellence," PC Magazine, January 17, 1989). I do not think that the ALR cache technology was sufficiently

unique to rate first place. More importantly, the Wells American CompuStar was completely ignored in the runners up categories. The Wells mod-



ular system is a quantum leap in hardware refinement, taking removable backplane technology in desktop publishing to its logical conclusion. The Wells American organization is just that—American—and deserves all our support for their innovative approach and high-quality output.

> Bill Copenhaven Richmond, California

SMART MONEY

I have to question how closely Donald Trivette evaluated all three products before he chose *MoneyMate* to be the "real star"

■ PC Magazine is a constant source of helpful information.
The only addition I can think of would be a swimsuit issue.

and "buy" of the three personal finance packages reviewed in After Hours, PC Magazine, December 27, 1988. I have used Home Finance System III since its introduction and consider it a smart software system that uses fast assembly language to incorporate unique design features that were not even mentioned.

Roy H. Andree Lake Ronkonkoma, New York

THANKS FOR EVERYTHING

I would like to thank everyone at PC Magazine and PC MagNet for their wonderful magazine and BBS. PC Magazine is a constant source of helpful information. The only addition I can possibly think of would be a swimsuit issue.

John Rago, Jr. Moccasin, California

BUT DOES IT RUN OS/2?

I was very disappointed that your review of 286 machines ("The 80286: Unsafe at Higher Speeds?")

Higher Speeds?" PC Magazine, December 27, 1988) didn't test for OS/2 compatibility. Why was this claim not tested? It's a make-orbreak point for me, as I would not



invest in a machine that didn't run OS/2
Andy Klein

Andy Klein Glendale, Arizona

I NEED MY SPACE

For many of your readers, PFS:First Choice is the last choice ("The Best of 1988"). I do my work on a Zentih laptop with no hard disk, and I find that the size of First Choice gets in the way of its use. With its .EXE file as well as all the overlays, the program requires two disks exclusive of data files. For now, I'll stick to Microsoft Works for my integrated program because it's functional and fits on one 720K disk with its spelling checker.

Richard B. Thomas Tacoma, Washington

CORRECTIONS/AMPLIFICATIONS

The new Intel 80386SX processor is 16 MHz, not 12 MHz ("Take It or Leave It: Portables with Desktop Power," *PC Magazine*, October 11, 1988).

HOW TO WRITE TO PC MAGAZINE

Send letters to PC Magazine, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (see the Productivity section for access information). All letters become the property of PC Magazine and are subject to editing.



\$ 195

NOW YOU CAN Print PostScript Language Text and Graphics On ANY Printer



GoScript Software, the Low-Cost PostScript Language Printing Solution

Choose the one that fits YOUR needs: GoScript - \$195 - With 13 Fonts! GoScript Plus - \$395 - With 35 Fonts! Both include our High Quality, Scalable Outline Fonts

*Includes Drivers for: NEC Pinwriter; HP LaserJet, DeskJet, PaintJet; Canon LBP-8II, BubbleJet BJ130; Epson LO and FX; Toshiba 24-Pin; Epson LO and FX; Toshiba 24-Pin; IBM ProPrinter, Quickwriter, Quietwriter

ORDER TODAY!

or call the LaserGo Order Line (800) 451-0088 (outside Calif.)

In Canada, Contact: CDP Communications, Toronto, ON, TEL: (416) 323-9666 FAX: (416) 323-3878 Exclusive European Distributors: Graphic Sciences Ltd.,

LaserGo, Inc TEL: (619) 530-2400

9235 Trade Place, Suite A, San Diego, CA 92126

THE POWER IS UP THE PRICE IS DOWN! Base System with 1.2MB 5.25" or 1.44MB 3.5" Drive Assembled & Tested IBM* AT Compatible, MS-DOS*, OS/2* & UNIX* Compatible

STANDARD FEATURES

- 80386-20 MHz
- NORTON V. 4.0 SI 22
- O WAIT STATE
- **PHOENIX BIOS**
- 1MB EXPANDABLE TO 16MB **RAM ON 32-BIT CARD**
- SHADOW RAM FOR SPEED

- 80287 AND 80387 SOCKETS
- 200 WATT POWER SUPPLY
- 2 SERIAL, 1 PARALLEL AND 1 GAME PORT
- 8 EXPANSION SLOTS
- DUAL FLOPPY/HARD DRIVE CONTROLLER
- CLOCK CALENDAR WITH BATTERY BACKUP
- Drive Options w/40MB (40ms) Hard Drive \$2749 \$2798 \$2948 \$3248 w/80MB (28ms) Hard Drive \$3049 \$3098 \$3248 \$3548 w/150MB (17ms) \$3794 \$3843 \$3993 \$4293 ESDI w/1:1 Interleav

386/20D

- 5 DEVICE BAYS, 3 EXPOSED
- 101 KEY ENHANCED KEYBOARD
- SWAN SETUP AND UTILITIES DISKETTE

TOLLERGE 1-800-468-9044

Swan TAPE BACKUPS

Swan KEYBOARDS

VIDEO OPTIONS





Include PC Talk III Software 2400 bd internal ..\$129 1200 bd internal \$69

2400 bd external .\$149 1200 bd external ...\$99 S=PMD1

Switchable
■ Hercules® to CGA
■ Parallel Port\$69 EGA ■ EGA/CGA/TTL

■ 640 x 480 ■ Parallel Port\$149 VGA

■ 256K Video BAM ■ 17 VGA Modes\$249



 40MB formatted storage QIC-40 Operating Std. Network compatible

40MB XT or AT Internal\$299 40MB XT or AT External\$399

101 key Enhanced Keyboard ■ XT & AT compatible \$69 84 key Keyboard ■ XT & AT compatible\$59

> **ALL SWAN** PRODUCTS **CARRY A**

FULL 1 YEAR WARRANTY ON PARTS AND LABOR.



distributed by TUSSEY COMPUTER PRODUCTS



COMPATIBLE AUTHORIZED

Swan 386/16 1999 Marines

DOO . OOKS. O OLAIV. COLLEGISCO					
386/16	VIDEO OPTIONS				
ive Options	Mono	14" Flat Moto	VGA Mono	VGA Color	
IOMB (40ms) and Drive	\$2549	\$2598	\$2748	\$3048	
SOMB (28ms) and Drive	\$2849	\$2898	\$3048	\$3348	
SOMB (17rms) hrs 1 bitoriouro	\$3594	\$3643	\$ 3793	\$4093	

Swan XT10

第二二

tem with Single 360K Drive, id & Tested IBM ® XT Comp

XT10	Include Menter & Video Adapter				
Drive Options	Mono*	CGA	EGA	VGA	
Dual Roppies	\$779	\$949	\$1178	\$1278	
"w/20MB (65ms) Hard Drive	\$979	\$1149	\$1378	\$1478	
"w/32MB (40ms) Hard Drive	\$979	\$1149	\$1378	\$1478	
A land the Court poor Floor But					

* Includes Single 360K Floppy Drive
! Upgrade from 12* to 14* Flat Screen, add \$49

NOW AVAILABLE! On-Site Service from

Sorbus A Bell Atlantic Company

Call for Details

EDUCATIONAL & CORPORATE **ACCOUNTS**

We offer a full line of services catering to your needs. To reach our Educational & Corporate Sales Department

Call: 1-800-468-9044 FAX: 814-237-4450

We cooperate with Federal Authorities to prosecute credit card frauds.

Swan 286/10

DITTI LICENSE

280/10 Indule Mentor & Video Adepter				
Orive Options	Mono†	CGA	EGA	VGA
w/20MB (65ms) Hard Drive	\$1399	\$1569	\$1798	\$1898
w/40MB (40ms) Hard Drive	\$1549	\$1719	\$1948	\$2048
Hard Drive	\$1849	\$2019	\$2248	\$2348
Upgrade from 12" to 14" Flat Screen, add \$49				
landard Features XT10				

\$1099 Monitor not Included

Swan 286/12

MS-DOS® OS/2	® Com	patible		
286/12	VIDEO OPTIONS			S
Orive Options	Mono	14" First Mono	EGA	VE
w/40M8 (40ms)	\$1649	\$1698	\$2048	\$21

MB (28ms) \$1949 \$1998 \$2348 \$2448

Standard Features	XT10	286/10	286/12	386/16	386/20D
CPU	8088-1	80286	80286	80386	80386
Speed (MHz)	10/4.77	10/6	12/6	16/8	20/8
BIOS	Phoenix	Phoenix	Phoenix	Phoenix	Phoenix
Norton SI Rating v 4.0	2.1	11.2	13.7	17.6	22.0
Wait State	0	0	0	0	0
Standard Memory	640K	512K	512K	1MB	1MB
Shadow BIOS	_	_	_	384K	384K
Memory Upgrades	_	640K/1MB	1MB	2/4/8/10/16MB	24/8/10/16M8
Coprocessor Support	8087	80287	80287	80287 or 80387	80287 or 80387
Expansion Slots: 32-bit		_	_	. 1	1
Expansion Slots: 16-bit	_	6	8	4	4
Expansion Slots: 8-bit	8	2	2	3	3
Dual HD/FD Controller	w.H.D. systems	Yes	Yes	Yes	Yes
Device Bays (Exposed/Internal)	2 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.
Serial Ports	1	1	1	1	2
Additional I/O Ports	All come with 1 Parallel and 1 Game Port				
Power Supply	150W	200W	200W	200W	200W
Keyboard	101 Key	101 Key	101 Key	101 Key	101 Key
Additional Features	All come with Clock Calendar w/Battery Backup and Setup/Utilities Disk				
OPTIONS:	XT10	286/10	286/12	386/16	386/20D
2 Et Claner, Daire	0.00.0				

Swan/MS-DOS & GW BASIC 3.3 add \$89

Swan386/20T

Assembled & Tested IBM* AT C MS-DOS*, OS/2* & UNIX* Con

386/20T	VIDEO OPTIONS Include Monitor & Video Adapter				
Drive Options	Mono	14' Flat Mono	WGA Mono	VGA Color	
w/40MB (40ms) Hard Drive	\$3049	\$3098	\$3248	\$3548	
w/80MB (28ms) Hard Drive	\$3349	\$3398	\$3548	\$3848	
w/150MB (17ms) ESDI w1 1 Interteeve	\$4094	\$4143	\$4293	\$4593	

To order: No surcharge on Discover, Visa, MasterCard or AMEX ■ Your credit card is MasterCard or AMEX ■ Your credit card is not charged until your order is hipped ■ COD orders accepted with no COD fee ■ We insure your order at no extra cost to you Shipping: 3% or \$5 minimum for UPS Ground. Call for shipping charges on Express Art, APO, FPO, AK, HI and all foreign orders Mail Orders; We accept money orders certified checks, and personal checks. Allow 2 weeks for personal and company checks to clear

Defective items replaced or repaired at our discretion

PA deliveries add 6% sales ax Prices and terms subject to change with out notice ■ We accept purchase orders from qualified Educational & Corporate institutions.



OPEN: 8:00 AM-11:00 PM M-F MMC 10:00 AM - 8:00 PM Sat 12:00 PM - 8:00 PM Sun

Tussey Computer Products 3075 Research Dr.

State College, PA 16801

INTERNATIONAL CALL 814-234-2236

TUSSEY COMPUTER PRODUCTS FAX: 814-237-4450 CIRCLE 530 ON READER SERVICE CARD



Not just another power trip.

The IBM PS/2 Model 70 386 with Micro Channel.

A desktop system with 386 power, loaded with memory, racing through complex applications at up to 25 MHz, is where the Personal System/2* Model 70 386 begins.

What it offers you beyond its sheer power, is where it begins to make a difference.

	Model 70 38	6	
Available models	A21	121	E61
Microprocessor	80386 25 MHz, 64Kb memory cache (30ns)	80386 20 MHz	80386 16 MHz
Optional Math Co-Processor	80387 25 MHz	80387 20 MHz	80367 16 MHz
Memory (RAM) Standard Maximum on system board System maximum	2Mb (80ns) 8Mb 16Mb	2Mb (85ns) 6Mb 16Mb	1Mb (100ns) 6Mb 16Mb
Dishette storage	1.44Mb 3.5-m	ch standard (2	maximum).
Fixed disk storage	120Mb (23ms) 120Mb (23ms) 60Mb (27ms)		
Built-in features	Video Graphics Array (VGA) and display port; diskette controller: sensi, parallel keyboard and pointing device ports, clock/calender.		
System expension	Three option slots (two 32-bit, one 16-bit).		

The Model 70 386 features Micro Channel," a 32-bit bus created to take full advantage of 386 technology. Micro Channel is designed for multitasking and multiprocessing. It allows the PS/2" to operate several intelligent processors and subsystems simultaneously. So you can do several jobs at once and still get truly balanced performance.

With the Model 70 386, complex spreadsheets go faster than ever. So do sophisticated graphics. Even networking is no sweat. And Micro Channel ensures a platform for future applications, such as imaging and advanced communications.

By combining Very Large-Scale Integration, advanced

Surface Mount Technology and built-in features, PS/2s deliver state-of-the-art reliability and design sophistication. The Model 70 386 runs most current DOS applications and is ideal for the new OS/2 applications.

Here, then, is a system that recognizes your need for power today, and helps protect your investment for years into the future. All at a price you'd expect to pay for 386 machines with "yesterday's" bus architecture.

For a demonstration of the PS/2 Model 70 386, see your nearest IBM Authorized Dealer or IBM marketing representative. Call 1 800 IBM-2468, ext. 119 for a dealer near you.

It'll be well worth the trip.





IF ANYONE TELLS YOU THEIR MOUSE OUT-PERFORMS AMITSUBISHI'S, THEY'RE SLIPPING YOU A MICKEY



We proudly present three reasons why Mitsubishi will soon be the mouse you'll

see scampering across more and more desktops: E-Mouse, M-Mouse and

S-Mouse.

These fast-moving, versatile mice are now showing up in every field in America. And with good reason. Because Mitsubishi understands the importance of building a mouse that meets the user's standards of speed, comfort and reliability

across a range of DPI requirements. And with that in mind, we built three mice designed to provide you with performance that you can rely on time and time again.



E-Mouse: the only 400 DPI serial mouse available. Combining microprocessor

technology with super precise optomechanical technology,

E-Mouse provides you with the highest possible resolution ever in a serial mouse-400 DPI. What's more, you can connect it directly to your PC's serial port without opening your machine and using up valuable expansion slots. Just plug it in and go! And E-Mouse is completely Microsoft® compatible too. Its 15 pop-up menus let you control cursor movements even in applications that don't usually support mouse devices.

M-Mouse: luxury features at a 200 DPI price - The Industry Standard.

Designed for a wide range of applications, the 200 DPI M-Mouse

is completely compatible with all IBM or IBM-compatible PCs with serial ports. It features a rugged, two-button dual control

system that uses reliable optomechanical encoding and single chip control circuitry. Best of all, M-Mouse fits comfortably in your hand and scoots along on Teflon™ feet and a silicon coated ball for incomparable movement response. No external power or special pads are ever required.

S-Mouse: the only 200-800 DPI variable resolution, hardware-driven mouse available. For the first time ever, Mitsubishi offers a newgeneration mouse that provides exponential tracking

> from 200 to 800 DPI. Armed with a selfcontained microprocessor control, S-Mouse can go from 10 to 13.8 inches per second with just a flick of your wrist. It's perfect for window environments. graphics, desk top publishing operations and any other applications that require high resolution graphics and use today's new larger CRTs. And like all other Mitsubishi mouse devices. S-Mouse is comfort-designed for hours of fatiguefree operation.



Each mouse device can be purchased stand-alone, or bundled with any of the following programs:

Drafix/CAD, EGA Paint 2005



To order or to find out more about Mitsubishi mouse devices, call toll-free:

PC ADVISOR



Help in finding software to beef up a laptop cursor, locating an inexpensive black-and-white monitor, filling a need for voice mail telemarketing, and upgrading from XT to AT.

THE CASE OF THE LOST CURSOR

I am looking for a way to change the defaut cursor style on my Zenith SupersPort 286. The cursor blink rate is fairly close to the LCD response time, so the cursor stays very faint. I would like to change it to a solid block cursor or slow down the blink rate, anything but what I have right now. The problem is exacerbated when I am using a word processor or spreadsheet. The cursor gets totally lost in the clutter. Do you know of any way to get around this problem?

Gopal Miglani Des Moines, Iowa

A product called No-Squint Laptop Cursor from SkiSoft Publishing (1644 Massachusetts Ave., Lexington, MA 02173; (617) 863-1876) can help you with your problem. This \$39.95 utility was reviewed in First Looks, page 56, PC Magazine, December 13, 1988.

BLACK, WHITE, AND READ ALL OVER

Can you please tell me how to get an IBM PC and/or AT clone to display black text on a white background without getting into the desktop publishing business? I just wart my wife's plain-vanila (and somewhat obsolete) word processor to put black text on a white screen (like ink on paper). Surely there is a video card/monitor combination that will do this. (I know about using ANSI.SYS to give inverse video. That works fine as long as you're in DOS.) I'd appreciate any suggestions you can offer. Jerry D. Robertson

Signal Mountain, Tennessee

In the March 29, 1988, issue of PC Magazine, there was an article entitled "Blackand-White Monitors: The Designer Collection." Of the 14 monitors reviewed, most (13) were for people with serious desktop publishing concerns. The cost of these monitors (or monitorivideo board combinations) ranged from \$999 to \$2,620. From what you say in your letter, I don't believe any of these products are what you are looking for.

One product in that roundup, the NEC MultiSync GS, from NEC Home Electronics (1255 Michael Dr., Wood Dale, IL 60191; (312) 860-9500), received the comment "is clearly out of its league among these high-resolution giants;" but it seems to fit your needs perfectly. It will give you the black text on a white background that you are looking for and will work with any IBM graphics adapter, from CGA to VGA (and Hercules graphics, too). Considering the suggested retail

■ Can you please tell me how to get a PC to display black text on a white background without getting into the desktop publishing business? price of just \$279, this is an economical way to get the display you want without asking your wife to switch to a word processor that allows control of background and foreground colors.

VOICE MAIL TELEMARKETING

Are you aware of any products that can perform the following operation (or some-thing similar)? A customer in need of pricing information places a telephone call to a business. A PC answers the call with a recorded message that prompts the caller for a product part number. The caller enters the part number via a touch-tone tele-phone. The PC references a dBASE III Plus database file to locate the price and verbally relays the price to the caller.

David C. Perry Wilmington, Delaware

In the January 17, 1989, issue of PC Magzaine, there was an article entitled "Replacing the Receptionist: PC-based Voice Mail Systems." Of the nine products reviewed, three are capable of inbound telemarketing, which is the application that you are describing. An inbound selemaketing feature means that a voice mail product can prompt users, record messages (typically in the form of orders), and dispense information.

Of the Ihree products, two are for single-line systems and one is for multipleline systems. For single-line systems there are BigmOuth from Talking Technology (4388 Piedmont Ave., Suite B. Oakland, CA 94611; (415) 652-9600) at a suggested retail price of \$259, and Watson from Nat-

■ PC ADVISOR

ural Microsystems (8 Erie Dr., Natick, MA 01760: (617) 655-0700) at a suggested retail price of \$199. For multiline systems there is VBX System, also from Natural Microsystems, at a suggested retail price of \$3,995.

To do what you want to do with the system, you'll have to do some programming. For example, Talking Technology sells a Programmer's Development Package, which you can use to tailor the operation of BigmOuth to your specific needs. The package will work in conjunction with any language that can call a software interrupt, such as BASIC, C, Pascal, and assembler. This toolkit costs \$79 (\$339 when purchased with BigmOuth). Additionally, if you are not an accomplished programmer, Talking Technology sells The Interpreter, a proprietary language that makes it easier to develop custom applications. The Interpreter costs another \$79 (or \$399) for all three).

NOT LEAVING THE PAST BEHIND

I own an IBM PC-XT clone that has 640K of memory, CGA board, game port, serial port, 2,400-bit-per-second internal modem, two 51/4-inch floppy disk drives, and a Seagate ST138R hard disk drive. My question is, since I want to upgrade to an AT, what hardware will I be able to salvage from my current system? I would also like to know if my current RAM chips would be usable in an AT motherboard. and can 8-bit add-on cards be plugged into 16-bit slots?

> Joseph Baccellieri Staten Island, New York

Since the IBM AT bus is an extension of the IBM PC-XT bus, 8-bit boards usually work fine when used in an AT. Therefore, your CGA board, ports, and modem should all work in the AT. The Seasate ST138R will work in the AT, and most XT hard disk controllers will work, too, but

the penalty you pay is slow performance. If the controller works, your floppy disks will work too

As for the RAM chips, 150-nanosecond chips should be used only in ATs that work at speeds of 8 MHz or slower. If you are upgrading to 10 or 12 MHz, the chips will not be fast enough. Your best bet is to purchase 100-ns. chips. Also, your XT motherboard may have some 64K chips and your AT board may require 256K chips.

The only other problem you may have is with the keyboard. If your keyboard is one of the switchable types, just switch to the AT setting and the keyboard should work fine. Otherwise, you'll need a new one.

ASK THE ADVISOR

Send your questions to PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016, or upload to PC MagNet (see the Productivity section for access information). Please specify your equipment.

Travel Companions.

The WorldPort 2400™ and the WorldPort 1200™ modems are the perfect travel companions for your portable computer. They work virtually anywhere in the world, including hotel rooms and phone booths, allowing you to connect in a few million more locations than other modems.

With features superior to internal units, the WorldPort line of moderns is the smart choice for all your communication needs. WorldPort modems operate from their own internal battery.

drawing no power from your laptop. Cutting edge technology brings you features such as Bell and CCITT standards, direct connect and acoustic interface (300 and 1200 bps), tiny size and a tiny price. The WorldPort 1200™ can be easily upgraded to 2400 bps and both the WorldPort 2400™ and the upgrade come with Carbon Copy PLUS™ communications software.

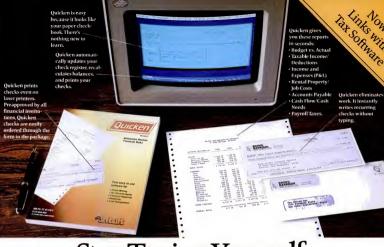
Find out more about the travel companions that won't tie down your portable computer. Call us

today for more information about the WorldPort line of modems, or the name of your nearest dealer, at 800-541-0345. (In New York. 516-261-0423.)



aunavA lenue 109t Northport, NY 11768 (516) 261-0423 TELEX: 6502848020 FAX: (516) 754-3491

WorldPort 1200 and WorldPort 2400 are trademarks of Touchbase Systems, Inc., Carbon Copy PLUS is a trademark of M



Stop Taxing Yourself. Quicken, \$49.95

uicken* is the fastest, easiest way to do your personal and small business finances. You'll slash time and effort every month, plus have perfectly organized financial records. Now instead of dreading tax time, you'll save even more hours, because Quicken links directly to the top selling tax software, I.K. Lasser's Your Income Tax" and Turbo Tax*

Forget Financial Hassle

Quicken is so automatic, it does your monthly financial work for you. It actually learns your regular bills. Just confirm the payment amounts on your auto loan, utilities, and other bills. Quicken does 14 bookkeeping steps and hands you the printed checks already addressed for mailing. All you do is sign them and seal the envelopes.

Automate Your Taxes, Too!

Quicken saves you hours at tax time, because all your tax information is right at your fingertips.

It prints itemized lists supporting tax deductions in just seconds. Or, you can let J. K. Lasser's Your Income Tax and Turbo Tax, quickly and accurately read income and deductions from your Quicken records and directly transfer that data to your tax forms.

Know Your Financial Situation in Seconds

Quicken gives you detailed reports such as budget vs. actual comparisons, income and expenses by category, accounts payable, accounts receivables, or P&Ls, on screen or on paper, almost instantaneously.

The World's #1 Selling Financial Software

Here's why Quicken is the world's most popular:



Ouicken is about as good as software gels: powerful. affordable, and easy to use. 12/27/88 Bill Howard Executive Editor PC Magazine

No Accounting Mumbo Jumbo

Quicken is as easy as the pen and paper you use now. You'll see the familiar checkbook and check register right on your screen. The only thing that changes is how fast you finish your financial chores. This is bookkeeping that's totally hassle-free.

For Personal and Business Use No other financial software provides more flexibility to handle the wide range of personal or business needs. Quicken is for service and

conoch® and Apple E ®

manufacturing businesses, doctors, consultants, designers and retailers, as well as for house-holds. Quicken is ideal for anyone who wants relief from bookkeeping hassles.

Try Ouicken FREE for 30 Days

Order Quicken today from the coupon below, or through our toll-free 800 number. If you're not completely satisfied with Quicken for any reason, simply return it for a full, no-questionsasked refund.

	Ouicken	7
	LILIKELLA	1
ı 🚜	40.0.0.	١
_		

I want to try Quicken on your no-risk 30-day guarantee If I'm not completely satisfied, I may return it within 30 days for a full refund. Quicken, \$49.95 plus \$3.00 shipne Cali

Call 800-624-8742

or, send this coupor	with your check or credit card number to Innuit.
Name	
Address	
City	State
Zip	Phone

Address	State
Zip	Phone
□ 5¼° disk	□ 3½* disk

□ 5%*disk	☐ 3½* disk
☐ Regular IBM version	□ DeskMate ve
Transfer Utility to Lotus &	(20 012 lancione

☐ Check enclosed (no purchase orders, please) □ Visa □ MasterCard □ Am Ex

**Intuit 540 University Av Palo Alto, Californ ornia 94301

PC0489

Nobody can beat our performance.

Imagine being able to get ALR's 25MHz 80386TM Flexcache 25386 desktop system for as little as \$3,495. And imagine saving \$4,800 when you purchase the 120MB FlexCache 25386 desktop system over Compaq's® Deskpro® 386/25 model 110. Our FlexCache 120MB system delivers 10MB more ESDI disk



storage at a whopping savings of 47%. All this and PC Magazines award for Technical Excellence. Nobody can beat that.

A little less power with greater savings? ALR's FlexCache 20386DT is the answer. Priced at \$2,695, you get an astonishing savings of \$2,500 when compared to Compaq's Deskpro 386/20e. A 48% savings on the very system which "proves that you don't have to be based in Texas to build the world's fastest PCs."

And you say you want entry-level. We've got it. ALR's highly acclaimed 386/220 which was voted "Best of 1987" by PC Magazine can be purchased now for only \$1,995. Even at that price you're saving \$1,400 when you compare it to Compaq's "new" lower cost Deskpro 386s. Not only are you saving 45%, but you're getting the true 32-bit 80386 processor.



\$1995.00	\$3599.00	\$2695.00	\$5199.00	\$5495.00	\$10299.00
ALR 386/220 Mod 10	Compaq Desepro Mes Mod 10	ALR FlexCoche 2036c01 Mod 10	Compag Desepro 386/20e Mod 10		Compag Designo 386/25 Mod 110
3.197 MIPS	2.489 MIPS	4.788 MIPS	4.569 MIPS	6.071MIPS	5.50 MIPS
Prices one configurations subject to change. Verify with manufacturer		\$5995.00	\$7999.00	\$12499.00	\$13299.00
		ALR PlexCoche 20346	Compag Designo 386/20e		Compag Desepto 385/25

4 MB of Memory Standard

At no additional cost, the award winning FlexCache 25386 tower configuration now comes standard with double the amount of memory. With 4 megabytes, the FlexCache 25386 is equipped to outperform any fileserver in its class.

Nobody can beat

Nobody can beat our price.



Our performance and pricing keeps us rising above the competition.



With ALR you'll receive unbeatable support backed by our oneyear warranty, unlimited technical support, optional on-site servicing from Intel and our worldwide network of authorized resellers. Call our toll free number today to find out more about these unbeatable systems and the name of your authorized reseller.

Advanced Logic Research, Inc. 9401 Jeronimo, Irvine, CA 92718 (714) 581-6770 FAX:(714) 581-9240

For our Canadian office: 1-800-443-4CAN For our UK office: 1-800-444-4ALR For our Singapore-Asia/Pacific office: (65) 258-1286 FAX: (65) 258-1285

1-800-444-4ALR

our dealers support.



CONVERT YOUR PC, XT OR AT INTO A HIGHER FORM OF LIFE!

Don't let your PC give up the ghost — Hauppauge has arrived with a new spark of life: the 386 MotherBoard." Far more advanced than an accelerator card, our line of MotherBoards grace your PC, PC/XT, PC/XT or compatible with speeds equal to the IBM PS2 Model 80. And faster. Because we've built in 1 Megabyte of high speed RAM and a 387 math coprocessor socket for speeds that will make your PC glad to be alive!

UNIX/386 and OS/2 Compatible. To ensure a long, fruitful life, our 386 MotherBoards are compatible with the PCAT (BIOS and L/O)—so you can run the new generation of DOS, OS/2. Our Boards also run Windows/386, UNIX V, PC-MOS/386, and XENIX/386 For more power, you'll find 16-bit expansion slots that accommodate the latest L/O expansion cards. Plus, we can add up to 15 Megabytes of 32-bit extended memory. No 386 accelerator card can give you so much versatility, Only our 386 MotherBoards give your PCs an untilmited future!

The Critics Applaud! PC Magazine awarded our Board "The Editor's Choice" for 386 Replacement Boards. PC World called it "the Upgrade Product of the Year." And PC Computing said: "The 386 MotherBoard is exceptionally compatible with existing IBM applications and peripherals — it will even run IBMS own version of OS/2" Technical Features • SX, 16, 20, 25, and 33MHz 80386 + 10 1 to 15 Mbye of high speed 32-bit 4-way interleaved RAM • PC/AT Compatible BIOS and I/O system for support of OS/2 and UNIX • 64k Of 30 nsec static RAM cache on 25MHz and 33MHz boards • Six 8 bit expansion slots and two 16-bit expansion slots (four on 386 MotherBoard for AT) • One 32-bit expansion slot for up to 15 Megabytes of high speed memory.

386 MotherBoard for the PC, XT, AT and Compaq portab	
386 MotherBoard 20, 25 and 33MHz for the PC/AT fr	om \$1995
386 MotherBoard/SX for the mini chassis	\$1295
32-bit RAM Boardsfi	om \$ 195
387 and Weitek coprocessors	om \$ 500
16-bit combination hard disk/floppy disk controller	\$ 175

Our 386 MotherBoard will give your PC a new lease on life! For more information, call: 1 (800) 443-6284. In New York: (516) 434-1600. All our products available at your local computer dealer. (Ask about our GSA pricing!)

Hauppauge Computer Works, Inc. 175 Commerce Drive, Hauppauge, New York 11788 (In West Germany, call 0211-594-320)





FIRST LOOKS

SideKick for Presentation Manager: A Glimpse at Applications to Come



HANDS ON

BY CHARLES PETZOLD

The OS/2 Presentation Manager is off to a great start with its first available application—none other than Borland's SideKick. IBM is bundling SideKick with BM is from OS/2 1.1 and updates from OS/2 1.0. The deal is currently scheduled to extend through June.

SideKick for Presentation Manager is quite different from the DOS SideKick, originally released in 1984 and still one of the most popular RAM-resident pop-ups. Completely overhauled and rewritten, the Pre-



The Phonebook and Appointment Calendar of SideKick for Presentation Manager generate files compatible with Borland's Paradox.

sentation Manager version makes such a leap over the DOS SideKick that the two packages have little in common except for the name and concept. You'll also find none of the strange under-the-cover tricks that characterize DOS pop-ups.

Beyond Convenience

In the Presentation Manager, every program is a pop-up, so a PM program must offer more than mere convenience. The ideal PM program is interactive and easy to use but also has some powerful features that remain unobtrusive until you need them. For the most part, this is

SuperCalc5 Mimics 1-2-3, Links And Displays Multiple Worksheets



HANDS ON

BY M. DAVID STONE

Most users recognize three classes of spreadsheet program: 1-2-3 as the standard, Excel as the leader of a new generation, and everything else. Super-CaleS (5495) is Computer Scales (5405) is Computer Scales (5405) is Computer Scales of the "everything else" category.

The Computer Associates strategy is simple: provide a mew-generation spreadsheet that anyone familiar with 1-2-3 can use immediately, that does some things—notably graphics—even better than Excel, and that can be run on computers

that would be painfully slow in using Excel's graphics interface. In short, with SuperCalc5, the battle of the new-generation spreadsheets has begun.

The laundry list of new features in SuperCalc5 ranges from minor conveniences such as the Undo command to important new-generation features such as the ability to link spreadsheets and display multiple spreadsheets on-screen. Other features include three-dimensional graphics, a set of Audit commands for troubleshooting spreadsheets, and support for PostScript printers, cartridgebased Laserlet fonts, and multiuser operation on several networks.

One of the most notable changes in Super-Calc is what Computer Associates terms co-existence with 1-23. In some cases this translates to slicker handling of a function that was atready in Super-Calc. For example, where Super-Calc Could import and export 1-2-3 flies, Super-Calc S can deal with WKS and WKI files directly, loading them, saving them, and otherwise treating them as an alternate Super-Calc format. You can even set the program to use

.WKS or .WK1 as the default. In other cases, coexistence with 1-2-3 translates into a new feature that makes SuperCalc5 easier for a 1-2-3 user to learn. (continues on page 34)

HANDS-ON INDEX

DATA JUNCTION 2.1

COMPUADD 286-20

CORE CNT-MCA The first bus-mastering disk

controller for the MCA....43

PIZAZZ PLUS

Converts color to gray scales, adds DTP file support 46

PC TOOLS DELUXE Adds desktop accessories, format recovery48

ASCII imports for Ventura

Publisher54 COREL DRAW!

SuperCalc5

(continued from page 33)

In particular, there are the menus. By most standards, the SuperCalc menu structure is an improvement over 1-2-3: most commands are easier to find and require fewer keystrokes than in 1-2-3. But the need to learn a new menu structure has been a serious obstacle in getting 1-2-3 users to switch to SuperCalc.

Computer Associates' solution to the problem is simple-provide both choices, SuperCalc4 users will find the menus they are already familiar with-along with a wealth of new options-in SuperCalc5. and Lotus converts can set the program to use the menus from 1-2-3, Version 2.01. A supplied utility can convert 1-2-3 macros into macros that will work within SuperCalc's 1-2-3 menus.

The one added choice on the 1-2-3 menus lets users venture



You can display up to three worksheets simultaneously with SuperCalc5 and link up to 255. Above, the worksheets are shown with the optional Lotus 1-2-3-like menus.

important new feature is its ability to link spreadsheets. Super-Calc5 gives you two ways to link spreadsheets. One choice is to create multiple pages within one file, with each spreadsheet on its own page. You can then formula that defines the file and cell to read from. This approach is the obvious choice if you want to collect reports from different departments or regions, for example, and consolidate the information into a single master spreadsheet.

Another important advantage of linking multiple files is that SuperCalc5 can read data not only from SuperCalc files, but from .WKS and .WK1 files as well. In other words, you can actually link SuperCalc worksheets with 1-2-3 worksheets. With the multiple file approach. you can also link an active worksheet (in memory) with worksheets on-disk. You can even combine the multifile and multipage approaches.

Whichever approach you choose, SuperCalc will let you link up to 255 worksheets. It will also let you view up to three worksheets at once and page through as many worksheets as you have in memory.

The new graphics options, including 3-D bar charts and line charts, put SuperCalc5 on a level with some of the best standalone graphics packages. Even better is Computer Associates' overnight slide service (provided through MAGlcorp) for converting SuperCalc5 graphics images to 35mm slides

Also noteworthy is Super-Calc5's potential for printed output. With the text printer defined as a PostScript printer. you can choose from all the standard PostScript fonts, Simi-

larly, you can install the text printer as an HP LaserJet Series II and pick up to three cartridges and three soft fonts. Unfortunately, the program does not provide this level of support for all printers. With the Canon LBP-81I, for example, Super-Calc5 doesn't support cartridges of soft fonts at all. Builtin graphics drivers are somewhat limited. However, SuperCalc can take advantage of external GCI drivers and comes with several, including some for specific PostScript printers.

Finally, there is the issue of hardware. Computer Associates is targeting the installed base of 8088 and 8086 machines, arguing that SuperCalc5 is the only new-generation spreadsheet that can run at adequate speeds on older, slower computers.

True enough, but there are other good reasons for moving to SuperCalc5-particularly if you're already familiar with SuperCalc4 or Lotus 1-2-3 menu structures. Take a careful look. You may find that SuperCalc5 is the preferred choice-even if you've already invested in a 386 machine.

2400 bos Modems Comparison Tests 5/N PLETEN, PLETEN, FORS FORS NLD 240 NLD 340

SuperCalc5 offers three-dimensional bar charts and line charts, along with an overnight service for producing 35mm slides.

into the SuperCalc menus. From there, you can perform a single command and then automatically return to the 1-2-3 menus. This not only gives users a way to get at the new features not available from 1-2-3 commands, but also offers a relatively painless way to learn the SuperCalc menus. You also can get to the 1-2-3 menus momentarily from SuperCalc's native menu system, a real frustration saver for 1-2-3 users still trying to make the change.

Aside from its coexistence with 1-2-3, SuperCalc5's most read values from one spreadsheet into another. This threedimensional approach lets you break a complex spreadsheet model into smaller sections, which are easier to troubleshoot and can be changed without worrying about accidentally affecting the others. This arrangement also lets you load all the spreadsheets at once.

The second way to link spreadsheets is to keep each spreadsheet in its own file. When using multiple files, you can read values from one spreadsheet into another with a

FACT

SuperCalc5 Computer Associates International Inc. 1240 McKay Dr. San Jose, CA 95131 (800) 531-5236 List Price: \$495; upgrades free to members of Computer Associates' SupportPlus maintenance plan, \$100 for other registered users and for registered users of competitive products. Requires: 512K RAM (640K recommended), hard disk, DOS 3.0 or later. Not copy protected. In Short: SuperCalc5 adds 1-2-3 compatibility, along with an abundance of expansive newgeneration features, such as the ability to link as many as 255 spreadsheets and display up to three spreadsheets simultaneously

CIRCLE 458 ON READER SERVICE CARD

SideKick

(continued from page 33)

exactly how SideKick for Presentation Manager has been designed.

Take the Calculator, for example. It's a nice general-purpose calculator, including trigonometric functions, financial functions (present and future values), logarithms, and exponentials. Programmers will miss hexadecimal conversions, but this is not a programmer's calculator. You can use the mouse to "press" the calculator buttons, of course, and all the buttons also have keyboard equivalents. A "paper tape" main-tains a record of the calculations

In that sense, it's just a simple, easy-to-use computer calculator. But that paper-tape display is actually a rudimentary one-column spreadsheet. You say you typed an incorrect number 40 calculations ago? No problem. Scroll back the paper tape, double-click the entry, and reenter the operation and number. The new value ripples through the subsequent calculations. You can save the tape in an ASCII format recall old tapes, and edit them to suit your whims.

The keyboard equivalents for the Calculator keys (and much other information) is available at any time from an SAA-style context-sensitive Help window. All the SideKick applications have this feature. You can keep the Help window on the screen while working with the program.

Mini Paradox

The Phonebook and Time Planner are the most-sophisticated SideKick applications. These are actually small database applications that draw on Borland's Paradox technology. SideKick for Presentation Manager includes a 287K dynamiclink library named PDOX .DLL, described in the header section of the file as "Mini Paradox." The programs create files that can be accessed, edited, and printed by Paradox.

The Phonebook is easy. You select New Card from the Edit menu (or click on the New Card icon) and type in the fields. Space is provided for a full address and for business home and alternative phone numbers. The entry is automatically alphabetized by last name and saved when you page to another card. By default each entry in the Phonebook occupies a full window, but you can also select a view that lists the entries one per line. You can search for a card by filling in a similar screen with selected information. As in any good database program, you can even redesign the Phonebook card layout.

The Phonebook has an automatic dialer that works with Haves-compatible modems. Of course, OS/2 will prevent the Phonebook from interrupting another program that may currently be using the communications port.

The Time Planner is an anpointment calendar with daily, weekly, and monthly views. Setting an appointment time is a little tricky at first. This was the only part of SideKick that required me to consult the Help window. You can set an alarm to remind you of appointments. The alarm uses a distinctive sound and a Presentation Manager message box. The message box won't be visible outside the Presentation Manager session.

but the sound is still audible. The Time Planner also has the most gratuitous feature in SideKick: you can tag appointments with any of a collection of tiny icons-a ship for travel, a wineglass for a party, a flag for national holidays . . . You get the idea.

The Notepad is the weakest part of the new SideKick. It has a search-and-replace and uses the Presentation Manager clipboard, but that's about it. It's limited to a 64K file length. The Notepad uses a monospaced Courier font rather than the default PM proportional font, but a pesky bug in its font selection logic causes it to use a stretchedout Courier font designed for the IBM Proprinter rather than one designed for the EGA or VGA.

I found a few other problems as well. For example, all four applications have .HLP files that contain the text for their



The SideKick for Presentation Manager Calculator offers a "paper tape" you can scroll and edit. It automatically recalculates final values based on changes you make.

Help windows. These should be resources that are part of the .EXE files. As it stands, the programs can't find their .HI.P files when loaded from a different subdirectory.

In addition, most of the EXE and .DLL files in Side-Kick are insufficiently segmented, boosting their memory consumption. Even with 4MB of memory, expect to wait while OS/2 clears out enough memory when you load a SideKick application

Finally, printing is rudimentary and doesn't use Presentation Manager facilities, so it's text-only and uses only the printer's built-in font. And you'll need to switch your Post-Script printer to Diablo emulation mode or you won't get anything printed out.

I forgive Borland for these flaws, as irritating as they are. I know how much the Presentation Manager was changing in the final months of development, and I'm surprised that Borland was able to get this product out as quickly as it did.

Bottom Line

One of my first articles for PC Magazine was a feature review of the original SideKick. I liked it and used it. But a couple of years later, disgusted over the mess that had developed with RAM-resident programs under DOS, I removed SideKick from my system. Perhaps the simplest way to show how I feel about the Presentation Manager

version of Side Kick is to divulge that I'm once again a happy SideKick user.

Of course, SideKick isn't the mythical "killer app" that will induce millions of users to switch from DOS to OS/2. But SideKick does demonstrate the power of OS/2 and the Presentation Manager and, once Borland's programmers iron out the program's few kinks. it will be even more of an asset to those who make the switch to OS/2.



SideKick for Presentation Manager

Borland International Inc. 1800 Green Hills Rd. P.O. Box 660001 Scotts Valley, CA 95066 (408) 438-8400

List Price: \$250; included free with IBM's OS/2 1.1. Requires: 3MB RAM, EGA or higher, OS/2 1.1. (4MB RAM, VGA card, and mouse recom-

In Short: This all-new Side-Kick shows off the Presentation Manager and provides powerful functions underneath an easy interface. Includes Calculator. Phonebook, Appointment Calendar, and Notepad. Not copy protected.

CIRCLE 457 ON READER SERVICE CARD

Data Junction 2.1 Adds Intelligence to Database, Spreadsheet File Conversions

HANDS ON

BY CRAIG STINSON

Data Junction, Version 2.1, formerly DataPlex, addresses two of the data processing manager's larger headaches: the need for efficient file-format conversion and the need to ensure valid data entry.

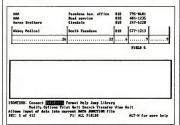
Modeled after the airline industry's hub-and-spoke strategy, Data Junction provides conversions to and from the following formats: dBASE (II, III, and IV), .DIF, Lotus 1-2-3, Symphony, Paradox, Enable, FOXBASE, FOXBASE Plus, Framework (II and III). Multiplan, Reflex, SuperCalc, VP Info, and VP Planner. The program also handles ASCII files in all forms (delimited, fixed, Macintosh), popular mailmerge formats (WordPerfect, Microsoft Word, WordStar), and mainframe and minicomputer data (EBCDIC, binary, and packed). A variety of binary numeric types is supported, including IEEE single- and double-precision floating point.

In all cases, conversion is a two-step process. Source data is first converted to an intermediate format (the Data Junction hub), then reconverted to the chosen output format. This approach makes Data Junction eminently expandable; Tools & Techniques can continue to add spokes as needs arise, without having to concern itself with the details of each possible pointto-point transfer. More important, it provides for a single interface by which to massage and filter data along the conversion

If users always wanted data to have exactly the same structure, content, and format on both ends of a conversion process, there'd be little need for a product like Data Junction. All popular database applications now provide their own simple conversion services-in and out of dBASE and 1-2-3, at the very least. In the real world, though,

data commonly needs a little massage in transit from one context to another. Fields may require alteration in alignment or width, some fields and records may need to be eliminated on

they are not the whole story. The hub can also serve as a data entry system, and the company has gone to great lengths to make this aspect of the program functional and flexible.



Data Junction lets you edit and massage files before you complete format conversion During data entry, it automatically recognizes data types, field widths, and validation

the output side, and new records and/or fields may need to be

The Data Junction hub provides a luxurious range of massaging and filtering services. Among other things, users can add, delete, reorder, and rename fields; specify filtering criteria to eliminate unwanted records; sort records on up to four fields: change field widths and alignments; carry out search-and-replace operations: and reformat dates, times, and other common data types. To facilitate these transformations, Data Junction provides a simple-to-use keyboard interface (modeled after that of Microsoft Word) and a context-sensitive help system.

Conversion filters and masks can also be encapsulated into script files for further streamlining. And for the ultimate in automation, the input and output file types and the script file can all be named on the DOS command line or stored in a batch file.

As important as these conversion capabilities are, though,

On the input side, Data Junction's Autostyle feature relieves users of the need to declare data types, field widths, and validation criteria. The program doesn't worry about widths; it simply adjusts to accommodate the widest entry in each field. As for data types. Data Junction looks at your first record and matches each field with one of its 48 predefined data types. Thereafter, it provides validation services to ensure that each field in each record is supplied with the appropriate kind of data.

For example, if you enter 11/16/43 into a field in record 1, Data Junction recognizes that information as a date. In succeeding records, you won't have to type the slashes, and you won't be allowed to enter numbers out of the appropriate

The built-in Autostyle types include all manner of dates (numeric and spelled out); postal codes for the United States. Canada, and elsewhere; Social Security numbers; telephone numbers; and many other com-

mon formats. You can add your own styles and validation criteria, and you can add field prompting as well. Or you can turn the whole Autostyle business off, if you wish.

Both in file conversion and in data entry, Data Junction is designed to eliminate programming. It's able to do this because it doesn't offer screen forms or structured reports. What you get is an abstract table structure with a lot of built-in in-

At first blush, the hub might strike some users as being too abstract for comfort. There's nothing fancy to look at hereno screen-painting, no pulldown menus, and only the most minimal effort at color support (you can choose between white on black, white on blue, and white on gray). And for some reason, Data Junction displays only four records at a time, reserving a large chunk of the screen as a static message area.

But the smarts behind the screen are pretty impressiveenough so that many users who buy the product solely for conversion purposes will find themselves using it as a data entry tool as well.

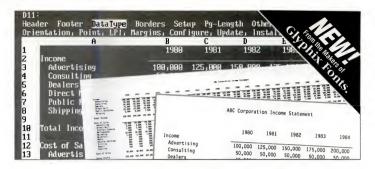
All in all, the package seems more than worth its price. If you often find yourself agonizing over data file conversions, give it a try.



Data Junction, Version 2.1 Tools & Techniques Inc. 1620 W. 12th St. Austin, TX 78703 (512) 482-0824 (800) 444-1945 List Price: \$195 Requires: 512K RAM (640K RAM recommended), two disk drives (hard disk recommended), DOS 2.0 or later. In Short: A hub-and-spoke system for database file conversion, equipped with an intelligent front end for entering,

editing, and filtering data. Not CIRCLE 440 ON READER SERVICE CARD

copy protected.



LaserJet Font Power in 1-2-3.

Print perfect spreadsheets on your LaserJet* with DataType, the new type selection Add-In for 1-2-3.

Select the orientation, type size, lines per inch and the margins you want from the DataType menu...Align and Go!

DataType makes it easy to condense a large spreadsheet and print it sideways, or enlarge and print a range for use as an overhead. And DataType doesn't get in your way. You still set headers, footers, borders and other selections directly from the 1-2-3 Print Options menu.

Introducing Data*Type*

- FOUNDRY QUALITY FONTS. Forget about dot matrix quality type. DataType includes SWFTE Letter Gothle fonts in nine sizes, ranging from 6 point (Miniscule) to 14 point (Mammoth). Print over 24,000 legible characters on a single 8.5* x 11* page.
- AUTOMATIC PRINTER SET-UP. No more set-up strings or macros to copy from spreadsheet to spreadsheet. Datalype handles printer set-up and downloading automatically. You simply select the range to print, Align and Go.
- AUTOMATIC PAGE FORMATTING. Select portrait or landscape, DataType automatically recalculates all margin and page length settings in inches for perfectly formatted output.
- ELIMÎNATE RAM CRAM. DataType uses only 10K of 1-2-3 memory, so it won't crowd even your biggest spreadsheet. And if you need to free up memory, you can load and unload DataType in two keystrokes - right inside the 1-2-3 Add-In Manager.
- IDEAL FOR NETWORKS & SHARED PRINTERS! A shared printer will be set with your font and your margins each time you print, even if another user has changed all the printer settings.
- INCLUDES LICS SYMBOLS. Use ©, ™ ¶, and the rest of the Lotus International Characters Set at each point size.

/1234567890ABCD

Actual 14 point LaserJet Output using DataType™

/1234567890ABCD Actual 14 point LaserJet Output using SIDEWAYS*



FORT CARTRIDGE OR ADDITIONAL PRINTER MEMORY REQUIRED

nade .	800 FAX 0F	R TOLL FREE)-237-9; RDERS (302) 42 FALL (302) 429-84	383
3 5" and 5 25" disks included	Name	(602) 120 0	
\$0095	Address		
89	City		State
	Zip	Tel	
Include \$5 for shipping Make checks payable to	& handling with all orde SWFTE INT'L, LTD.	· C.	. 540
All SWFTE prod			ите

SYSTEM REQUIREMENTS 18M PC, AT, XT, PS2 or compatible, a hard drive, Large-Jet Plus, Series III or compatible printer. MS-D0S 2.0 or later, 1-2-3 Version 2.0 or later. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. SIDEWAYS is a trademark of Funk Software. C 1989 SWFTE International, Ltd.

**To Bat'yee is Exceeded one per printer. Multiple users may use DataType on a single shared printer.

P.O. Box 219 Rockland, De 19732

CIRCLE 299 ON READER SERVICE CARD

\$1,695 CompuAdd 286-20: Yet Another Voice Enters the 286 vs. 386 Debate



HANDS ON

BY JONATHAN MATZKIN

The CompuAdd 286-20 PC. like all 20-MHz 286 machines. presents a dilemma to the potential buyer. The machine's performance is almost beyond criticism-it has speed and power to spare. But it's a 286-based machine in a world turning to newer 80386 technology. And in its basic configuration, the \$1,695 system is only \$200 cheaper than CompuAdd's 16-MHz 80386 machine.

A look at the results of the PC Labs benchmark tests dispels any doubts about how this well-built box performs. On the processor speed tests, the CompuAdd 286-20 screams along at two to three times the speed of an old standard 8-MHz IRM PC AT. Results from the 80286 Instruction Mix test were particularly impressive; by this measure, the 20-MHz system is fully three times faster than the original AT.

Add a fast disk to a machine with this kind of raw power, and you've got something to reckon

Our evaluation unit came | with a monster 320MB drive that clocked in at 14.66 milliseconds on our hard disk BIOS Disk Seek benchmark test. Equipped with this big disk and VGA graphics, the system costs



The CompuAdd 286-20 is a solid, fast performer. The \$4,949 system we tested-with VGA graphics and a 320MB drive-was a power user's picnic.

\$4.949-including an authentic Harris 20-MHz 286 chip.

One anomalous result did turn up when we tested the machine's extended-memory readand-write times. It turned in a relatively sluggish performance-actually slower than a standard AT. That may be the result of slow switching in and out of protected mode by the Award BIOS. In any case, this can be largely overcome by shadowing the system and video BIOS into RAM

The Award BIOS has the familiar Ctrl-Alt-Esc key sequence for BIOS configuration. I was annoyed to discover, however, that you can invoke the configuration screen only during a short period at boot-up. Miss your cue and you have to

While testing the machine, I took advantage of an optional megabyte of extended memory by installing DESOview and configuring the software to swap applications to a VDISK RAMdisk in extended memory.

Set up in this way, the CompuAdd 286-20 is a power user's picnic. Full-sized applications are swapped almost instantaneously, allowing rapid context switching between word processors, spreadsheets, and whatever else you are working with. We tried XyWrite, Lotus 1-2-3, Tornado, and several other applications, all of which ran fine. Microsoft's Flight

Hz IBM PC AT = 100

Simulator also took off without

If what you want is a firebreathing DOS machine, the CompuAdd 286-20 is a good choice. But you give up access to 80386-based software, and that's something to think about



CompuAdd 286-20 CompuAdd Corp. 12303 Technology Blvd. Austin, TX 78727 (800) 666-1872 List Price: \$1,695 (with 1MB RAM, one floppy disk drive. two serial ports, one parallel port, hard disk controller). In Short: A well-built 20-MHz 286 machine from a well-established mail-order house.

CIRCLE 442 ON READER SERVICE CARD



Benchmark Tests: CompuAdd 286-20 vs. 8-MHz IBM PC AT and Compag Deskpro 386/20

he CompuAdd 286-20's 80286 Instruction Mix and Conventional Memory test results are on a par with other 20-MHz 286 machines, but a 14-millisecond hard disk drive es its DOS File Access times stand out from the crowd. (See the December 27, 1988, for benchmark tests of 20-MHz ATs.)

nd random the read—are timed and the results sun The test is carried out for two different types of file irge-record files—that are used by common PC ap

1	A CONTRACTOR OF THE PARTY OF TH		DOS File Access (small	DOS File Access (lerge
Performance Times (Times given in seconds)	80286 Instruction Mix	Conventional Memory	record) without cache	record) without cache
8-MHz IBM PC AT	8.96	1.32	72.63	19.74
CompuAdd 286-20	2.91	0.55	63.10	4.66
Compaq Deskpro 386/20	2.91	0.40	56.78	9.34

«« Data Guardian »»

New Disk Optimizer gives you the courage to say yes!

Introducing Disk Optimizer 4.0. Now with Data Guardian and Undelete.

It's the moment of truth.

You've decided to erase an entire directory, and your computer asks, "Are you sure?"

Well? Are you? Is it the right directory? Will you ever want these files

again?

Enter new Disk Optimizer 4.0 with Data Guardian. The only disk utility software that lets you blitchely say "yes" now, and if you want, change your mind later. Because only Data Guardian ensures that anyone can Undelete files, directories, even entire disks. And do it hours, days, up toweeks later, no matter what else you've written to your disk in the meantime.

Best of all, Data Guardian makes file recovery quick, easy and totally foolproof. Without the complexity of other data recovery software. And without the uncertainty. Thanks to Data Guardian, Disk Optimizer comes through for you every time.

You formatted what drive?

That's fine for erased files, you say. But what happens if you accidentally format your hard disk? No problem. Disk Optimizer comes through again with *UnFormat* that can instantly restore all the data on your disk to exactly where it was before that little slip of the finger on the keyboard.

And to make sure your data is really safe, the TrackSouer feature protects the surface of your disk from excessive wear by preventing the head on your drive from spinning over the same track for too long. And the Refresh program prevents the bad spots that develop on disks due to fading magnetic charges.

Still the safest buy in performance optimizers.

As always,
Disk Optimizer also gives
you the safest,
most advanced
performance optimization available—
proven by over a
quarter of a million
users.

The Optimize program speeds up disk reading and writing times by up to 300 percent by un-doing the file fragmentation that takes place naturally over time. The DOC onfig program lets you arrange the layout of your disk for best overall performance. And the Analyze program gives you a graphical look at the condition of your disk, so you'll always know when it's time to oottimize again.

A total of 17 different programs. Disk Optimizer includes Findfile

for locating files by name or wildcard anywhere on your disk. Sorts for rearranging files and directories in the

way that makes sense to you. Lock and Unlock for password-protected file security. Killfile for erasing sensitive

data permanently. And lots more. In all, there are 17 different programs in the new Disk Optimizer. Each one designed to improve performance.

guard your data, and make disk management easier and simpler for

everyone. So get new Disk Optimizer 4.0, and

get more than the courage to say yes. Get the peace of mind and total confidence that your disk is running

nt by un-doing the file entation that takes place Available at software dealers everywhere.

Or, order direct by calling toll-free.

Call 800-272-9900
(603-627-9900 in NH)
CIRCLE 334 ON READER SERVICE CARD

SOFTLOGIC SOLUTIONS

better and safer all the time.

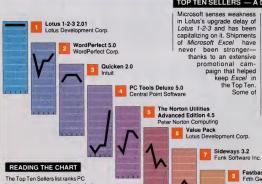


SoftLogic Solutions, Inc. One Perimeter Road, Manchester, NH 03103.

#6



PIPELINE



TOP TEN SELLERS - A 5-Week History

been in place for a while, such as the full-money-back guarantee that's in effect until January 31, 1990. In its more recent offen-

the current incentives have

sive. Microsoft has offered to pay \$75 to new users who can prove they switched from Lotus by surrendering their Lotus 1-2-3 master disk and sales receipt at the time they register a new copy of Microsoft Excel. In addition, the Excel sales force has been doubled, and a series of free seminars around the

country has been scheduled

business programs according to their sales totals in the week ending January 28. The chart that appears to the left of each program's name shows how the program's sales ranked each week for 5 weeks. The hash marks at the bottom of each chart represent each of those 5 weeks. beginning with the week of December 26. Dramatic shifts in a particular program's ranking may be the result of seasonal factors or sales promotions conducted by individual retailers. More than 12 000 individual locations contribute to the list

Fastback Plus 2.01 Fifth Generation Systems Inc.

> TurboTax '88 ChipSoft Inc.

> > Microsoft Excel 2.10 Microsoft Corp.

Rankings are based on net sales by unit: returns are subtracted from gross sales.

Sales information compiled by Ingram Software Inc. and PC Connection Inc.



The last time we asked PC MagNet callers about desktop publishing, we left out graphics software. This time, we looked at the two together and found that the combination made many people go even further, thinking about their expectations for word processors that have extensive page layout features, like WordPerfect and Microsoft Word. Samna's brand-new word processor, Ami, made a few respondents' lists in the "other" category, although it didn't gamer enough of the 900 responses to generate 1 percent.

The results bode well for both Aldus and Xerox, with their high-end desktop publishing programs. IBM, which is selling its Interleaf Publisher for 386 PCs only, didn't fare as well.

Do you or your company plan to purchase desktop publishing or graphics software within the next 12 months?



386SX CHIPS HEADING FOR THE SPOTLIGHT

ver since Compaq unveiled the first 386 PC in September 1986, the trend among PC buyers has been a slowly but steadily growing preference for the more powerful of Intel's line of microprocessors. You might think Intel would want to do everything it could to help accelerate the trend. Yet Intel is now doing its best to divert the momentum away from its topof-the-line 386.

No. Intel won't be enhancing the 8088 or 286. It's dropping the price on the 386SX (the 16bit I/O version of the 386 that it introduced last year) in order to gain more market share for the chip. In February, Intel cut the cost of 16-MHz 386SX chips in half (from about \$165 each to roughly \$90 for bulk orders). And it's bringing two brand-new factories on-line to stamp out more chips.

Intel is hoping to highlight the greatest advantage of the 386SX-delivery of 386 features at lower cost-in order to steal some of the thunder that Harris has built up with its fast CMOS 286 chips.

Intel has had fabulous success with processors, but the SX has taken off faster than either the 286 or 386. In its first 6 months on sale, five times more SX chips were shipped than 386s

in that processor's first 6 months. The SX also beat the 286 by a ten-to-one margin for the comparable launch period.

The SX price cut has some risk for Intel, since the company is often caught at the wrong end of a supply-demand curve. A year ago, Intel couldn't keep up with the strong demand for 386 chips, but now there's a glut. Howreduced in February when a federal judge ruled that NEC could continue selling its competitive V series. The judge found that Intel had forfeited its copyrights on the 8086/88 by allowing licensed third parties to distribute chips without proper

ter than to see the 286 become the low-end PC processor while the 386SX supplies the middle range. The company still refuses

copyright notices. Intel would like nothing bet-

or to fill in for machines in the shop, the chain is planning to open Businessland Rents centers in 20 cities over the next few years. With so many choices in

circumstances like setting up a

temporary location or when

dealing with an unpredicted

are poised to take off. Citing the

tendency of many companies to

rent top-of-the-line PCs as a

way of testing new technology

Businessland thinks rentals

adapters, disk drives, and printers, there's now more of a motivation to try expensive setups before buying.

Signposts

project.

Many of the stories on hardware and software vendors in the financial papers of late have been reports of layoffs and plant closings. It might lead you to believe that there'll be fewer products coming to market. . Unlikely

Western Digital has eliminated 400 jobs, reducing its workforce by 12 percent in recent months; but those savings are a result of automating assembly, and the company's revenue continues to rise. AST laid off about 6 percent of its entire staff, but it's scaling back an effort to sell DEC hardware and will concentrate on its core PC products instead.

Leading Edge, on the other hand, is suffering badly. It had to lay off its entire sales force and entertain takeover bids. It's rumored that a supply of bad parts was the last trauma in a series of bad management decisions. The brand will probably be kept on the market with new management.

At the same time, others have been expanding. Macola is doubling its staff and office space; WordPerfect Corp. has just finished doubling its personnel (including a doubling of the telephone support crew to 400); and Dell Computer is tripling its capacity in 1989. -Gus Venditto

Intel would like nothing better than to see the 286 become the low-end PC processor.

ever. Intel sees the real threat to its leadership role coming from the fast 286s. Since 386 machines, with their RAM caches and fast hard disks, tend to sell for significantly higher prices than 286 PCs and therefore don't appeal to everybody, Intel is trying to maintain dominance in both the highend and the middle range. It's now holding on to about 65 percent of the 286 processor market and a significantly lower share of the 8-bit 8088 shipments.

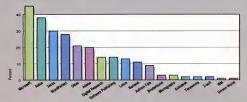
The value of Intel's 8088 processor was significantly to license production rights to either of its 32-bit chips, and since it now seems fully able to supply all the demand on its own, it's unlikely that that will

Right now, Intel seems more interested in forcing the secondsource producers of the 286 and 8088 into oblivion.

Businessland Sees PC Rentals Growing

PC rentals have been a limited phenomenon. Unlike earlier computer equipment, PCs are so cheap that rented machines have been necessary only in special

From which of the following companies will you or your company purchase desktop publishing and/or graphics software within the next 12 months?



Get out of the danger zone with Oracle's dBASE compiler



Announcing ORACLE Ouicksilver

All the database Top Guns are flying SQL, the industry-standard data management language first delivered by Oracle. Now, ORACLE Quicksilver adds SQL and connectivity to your dBASE applications, so you can fly them into the 1990s.

Your ticket to the future

ORACEE Quicksilver is a compiler that turns your diskap Frograms into fast, secure, multi-user applications that can access both distributed ORACEE and dBASE data. It delivers all the capabilities of dBASE, plus powerful extensions like windowing, graphics anduser-defined functions. You can even add SQL statements to your dBASE programs for more powerful, flexible data access.

ORACLE database included

ORACLE Quicksilver comes with the ORACLE RDBMS. So you can get automatic indexing, comprehensive security, and mainframe-class data integrity.

Why wait until dBASE IV can talk to SQL Server?

dBASE IV doesn't talk to SQL Server yet. When it finally does, it will only talk to SQL Server on OS/2—not on any other operating system. Which means you'll still be isolated from corporate data on minis and mainframes.

Add connectivity to your dBASE applications today

Your ORACLE Quicksilver applications can talk to ORACLE SQL databases on your PC today. And with our optional networking software, you can build distributed databases across ORACLE servers on PCs, minis and mainframes—including IBM DB2 data.

No-risk Money Back Guarantee

Test fly ORACLE Quicksilver now. If you're not of the danger zone in 30 days, return it for a full refund. Limited Time Free Offer: Order now and, for a limited time, you'll receive ORACLE SQL*Tutor — our online SQL training program—absolutely free.

Call 1-800-ORACLE1, ext. 4425 today.
Or fill out and return the attached no-risk coubon now.

Dear Oracle...

Oracle PC Direct • 20 Davis Drive • Belmont, California 94002 1-800-0RACLE1, ext. 4425

Send me the following ORACLE products for my PC.* Enclosed is my □ check or □ VISA □ MasterCard □ AMEX credit card number and authorization for.

uthorization	n for:
	ORACLE Ouicksilver at \$699 and
	ORACLE SOL+Tutor free
_	ORACLE SQL*Tutor ONLY for \$19
	Please add appropriate state sales

Please add appropriate state sales tax Total enclosed/authorized. Lunderstand Oracle will pay for shipping, and all prices valid in U.S. only.

NAME	TITLE
COMPANY	
STREET (NO PO DOME, print	100)
CITY	STATE ZIP
PHONE	

**REQUIREMENTS ORACLE SQL*Tison 2058 PC and not of the ORACLE Quick-short To manage only 49MSE DSF Here and no DRACLE datasesses, you need a 64MX PC. To manage on DRACLE datasesses you need a 64MX PC. To manage on DRACLE datasesses To broad put not only 19MX PC and optional netherolong statement. To build an

COMPATIBILITY - CONNECTABILITY

nars of Oracle Corporation Also trademarks dBASE of Astron-Quicksafver of Quicksafver Software Inc DBQ, OSS2 and IBM of national Business Machines. Other companies mentioned own and other and other companies of the Companies o 20 Davis Drive: Belmont, CA 94002 • World Headquarters (415) 598-9000 • ORACLE Canada (900) 397-4407 (encept Quebec) Quebec (514) 307-0755 • ORACLE Systems Australia 61-2-999-5080 • ORACLE Europe 44-1-948-6911 • ORACLE System Month (Ann.) 812-5-568644.

Finally...The First Bus-Mastering Hard Disk Controller for the Micro Channel



HANDS ON BY WINN L. ROSCH

Sometimes revolutions tiptoe in so quietly you might not notice the radical changes they bring until they've slipped into your life. Core International's new MCA hard disk subsystem, a combination of the company's \$6,495 HC-380 hard disk and \$595 CNT-MCA disk controller, is a case in point. You may be tempted to buy this pairing for your PS/2 Model 60 or 80 just because it's among the fastest mass-storage combinations around. In fact, as the first busmaster disk subsystem for the Micro Channel architecture, the pain ushers in a entirely new technology.

Put simply, a bus master can take over control of the expansion bus and directly access memory or other devices connected to it. While the bus master is in control, the host computer's microprocessor can do other things.

Although current software doesn't take much advantage of this ability, bus masters earn merit for another benefit. Even the best conventional hus technologies require at least two microprocessor cycles to move a byte from point A in memory to point B—one cycle to set up the transfer and one to make the actual data move. The bus master can make the memory move in half the time (one bus cycle). Potentially, the effective data throughput between disk and

computer can double.

The Core system exploits both benefits of bus master technology. Novell-based systems can take advantage of the subsystem's ability to duplex hard disks, which uses some of the CNT-MCA's bus master power. Two Core disk drives connected to the controller can operate in tandem, capturing all disk writes at the same time and assuring that you will have a duplicate for backup should one disk fail. (Although the CNT-MCA controller will work with other drives, it supports duplexing only with Core drives.) At the same time, bus master speed gives the total system a performance edge over other hard disk options.

The HC-380 hard disk is based on a high-performance Control Data Corp. drive that features a DOS formatted ca-

pacity of 380MB (442MB unformatted). It delivers an average access time of 16 milliseconds and transfers data at 10 MHz, thanks to its ESDI interface.

The CNT-MCA controller is a 16-bit Micro Channel expansion card that follows the IBM standard to the letter. The current implementation supports one or two ESDI drives with data transfer rates of 10 MHz. An upgraded version to handle future 15-MHz ESDI drives is in the works.

Unlike the standard-equipment IBM hard disk controller, the CNT-MCA will correled with other controllers, including both the IBM and a duplicate of itself. You can keep your stock IBM drive and add the HC-380/CNT-MCA system without a hassle.

In testing, performance proved the technology. As data blocks get larger, the Core system edges past twice the speed of the stock IBM system—more than could be hoped for from the upgrade to the ESDI interface alone. (System overhead and mechanical factors prevent doubling the throughput.)

In truth, the performance



Core HC-380 (hard disk) Core CNT-MCA (controller) Core International

7171 N. Federal Hwy. Boca Raton, FL 33487 (407) 997-6055 List Price: Core HC-380, \$6,495; Core CNT-MCA,

Requires: IBM PS/2 with Mi-

cro Channel architecture.

In Short: A high-performance hard disk subsystem for Micro Channel PS/2s, featuring the first bus-mastering hard disk controller for the MCA. Supports Novell disk duplexing.

CIRCLE 454 ON READER SERVICE CARD

improvement alone may not be enough justification for this system. However, its support of Novell duplexing as well as multiple drives and controllers makes it an excellent choice for Micro Channel-based servers. Although the HG-380/CNT-MCA combination only hints at the potential of Micro Channel bus masters, its power and performance confirm that the revolution is under vax.

PC

Benchmark Tests: Core CNT-MCA Disk Subsystem vs. Stock IBM PS/2 Model 60 Subsystem

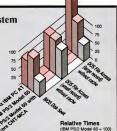
The Core CNT-MCA provides substantial improvement over the IBM PS/2 Model 60's standard controller, though the favorable test results are mainly a result of the faster mechanical speed of the Core disk. The disk tests were not designed to reflect the performance gains of a bus-mastering controller.

Performance Times (Times given in seconds except where noted)	BIOS Disk Seek (milliseconds)	DOS File Access (small record) without cache	DOS File Access (large record) without cache
8-MHz IBM PC AT	29.20	72.63	19.74
IBM PS/2 Model 60	37.24	72.41	10.86
IDM DC/2 Model 60	16.55	60.00	5.11

The BIOS Disk Seek benchmark test measures the time it takes to do a random seek using the disk's ROM BIOS. The test result includes minimal software overhead and may not parallel the manufacturer's claimed average access time. The test program performs 1,000 seeks. The average result is shown in

with Core CNT-MCA

The DOS File Access benchmark test measures the inroughput rate of the disk being tested. In this case, stroughput limes are measured in terms of how long the disk takes to perform common DOS file-management functions. Five tasks—file creation, sequential file write, sequential file read, random file write, and random file reed—are timed and the results summed.



The test is carried out for two different types of files—small-record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and lerge records are typically used for word processing and spreadsheet files. Loading a DOS program is also smulated by the large-record test.

Watch for our weekly ads in the centerfold of Sunday's New York Times second main section.

Panasonic

Panasonic SPECIALI KX-P1092&

Dot Matrix Printer
200 Psdraft, 48 CPS NLQ. 10, 12, 15,
17 and proportional, Friction and
adjustable tractor, Graphics, Cen-

\$29995

KX-P1180

Dot Matrix Printer 192 CPS draft, 38 CPS NLQ mode, 4 selectable fonts, Push/pull tractor feed. Proportional spacing. Cen-

\$18995 PACKARD



HP-2276A Desk Jet Printer ink jet printer Laser quality output. Quiet operation. 240 CPS draft mode. 120 CPS LQ mode. Built-in sheet feeder. Parallel & RS-232C serial.

\$69995

Panasonic



Laser Printer \$1399

Laserjet II

8 pages per minute. 200 capacity, 512K RAM, Six refonts. Two font cartridge sto Parallel and serial interface.

In Stock

TOSHIBA





\$56995



P-3-FI-3L

24-Pin Dot Matrix Printer. 216 CPS
draft, 72 cps NiQ. Toshiba and IBM
emulation. Front panel font and
pitch selection. Bulk-in Tractor and
friction. LCD status Indicator,
Parallel, RS-232 serial.

PRINCETON: Autosync Mono Monitor



14" flat screen monochrome monitor for IBM PC, XT, AT, PS/2 8 \$26995

LOGITECH for PS/2 \$2599

Scan Man

\$18995

Hand held scanner with a 4 Inch scanning window. Scan and store images from various sources to be used with popular paint and

ELASER CONNECTION PostScript SPECIALI

ostScript® printer for desktop whing includes 3MB RAM & 35 resident typefaces. Acce Call





Plus

41

Hardcard A high performance hard drive on a card fits XT or AT. Takes up only

20MB Hardcard \$499 40MB Hardcard \$649

TrueScan TrueScan gives your HP or Dest scan-ner the intelligence to capture everything on a page. Whether typewritten, typeset, laser printed, computer generated or even dot-matrix output, regardless how com-ellicated this popul.

ALERA

Truescan's w/248 RAM \$2195

0

Advantage/2 with 512KB RAM supgradable to 8MB, features easy installation. Takes full advantage of the PS/2 models 50 & 60 high per-formance data bus & extended

\$31995

Advantage/2

DEST

PC Scan 2020 ge and text scanner. The total ktop publishing solution, Up to 300 DPI res. 256 level grey scale image scanning. Built-in SCSI port. Call



A 9000 FAX-modem communications board for X1, At and computations, allows you to seed and receive virtually any type of the over ordinary online lines, receive virtually any type of the over ordinary online lines, receive ordinary onlines to other score of a strainmissions. See seed to see the overall of all of the overall overall of the overall of

\$76995

FOR CONNECTIVITY OUR NETWORKING

MAXUM 286 30 DAY MONEY-BACK GUARANTEE!

Buy with confidence. The acclaimed 286 computer offers high quality with exceptional performance and value. You also get one-year on-site "GE" service and access to our direct Technical Support Hotline. We're so sure you'll be satisfied that we back your (286) purchase with a 30 day money-back guarantee providing it's in the original configuration and packaging as deli-vered and has not been altered, modified or damaged by buyer

MAXUM 286 TURBO

WITH 12-MONTH ON-SITE LIMITED WARRANTY

Hard Drive

Mono-Graphics Systems

- 80296 processor 512K RAM
 8 expansion slots 12MB disk dr
 8 attery backed clock/calendar
 5 storage device carletes
 Hard/floppy disk controller
- 12" monochrome monitor
 - 8-10MHz 8-12MHz 40MB Hard Drive in med 40MB Hard Drive so med

91499 1699 1549

44MB Hard Drive as med EGA 640x350 Card & EGA Monitor (instead of Mono) add \$449 On-site service within 100 miles of GE's service locations applies to parts and libbor on CPU, monitor retono and standard EGA in advertised packages implicand and disk drive; if found to considerable in security in company of the company of th

PowerMate 386/20

- 80386 CPU
 80386 CPU
 20MHz + 2MB RAM
 5½" 1,2MB drive
 42MB (28msec) hard drive
 2 serial, 1 parallel
 - Super Special



NEW! Vendex HEAD START"III

- 80286 8/12 MHz switchable • 1MB RAM included,
- upgradable to 3MB • 51/4" 1.2MB disk drive • 31/2" 1.44MB disk drive
- 31MB (28msec) hard drive VGA analog graphics adaptor with EGA, CGA, MDA & Hercules software compatibility
- 2-RS-232 C serial ports · Parallel printer port Joystick port
- 3-button mouse Enhanced 101 keyboard
 MS DOS 3.3/GW BASIC
- Bundled software
 VGA color or VGA monochrome monitor (optional)



116 Nassau St.

67 West 47th St. 1-212-398-1410

1-212-608-6934 115 West 45th St. E. Meadow Plaza

Shopping Ctr. 1-212-398-1410 1-516-794-3660

SOLUTIONS, CONSULT GROUP(212) 254-3105

NEW! MAXUM' Turbo-XE II 20MB Hard Drive System • 908 477954 MRz. • 600 RAM • Paraletiserial port • Clock calendar • Bu CGA color & monographics video ono & CGA • Paramer/serial port cook calcer of a 514: CGA color & monographics video card a 514: 360K floppy • 20MB hard drive • MS DOS 3.3 • GW Basic • Keyboard • 110/220V switchable \$895 with 40MB \$995

NEC \$8000 MultiSpeed" HD

• 640K RAM • 31/6" 720K flooply



LEADING EDGE Model D-30

8088 CPU 30MB hard disk drive 4,77/7,16MHz 512K RAM Parallel, serial po



NEW!

\$995 odel D-3 386 \$3195

PowerMate* 1 Plus 80286 Desktop

80286 CPU • 640K RAM 1.2MB 514" floppy drive 40MB (28ms) drive \$8800

Enhanced 101 keyboard DOS 3.3 & GW BASIC 3 Internal storage device \$2195

\$11100

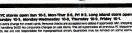
Premium 386-C/340

 80386 20MHZ CPU
 1MB RAM - 84 high speed cache me
 5½" 12MB floopy drive
 MS DOS 5.3 & CW Basic - BMM mans
 2 serial, 1 parallel port - Enhanced \$3495 \$249500 386/Model 300 (AST-68) Limited

COMPAQ Deskpro-386-S Model 20

90396 SX CPU—16MHz
 1MB enhanced page memory
 5%* 1.2MB drive • 20MB hard driv
 Video VCA graphics card
 Parallel & serial port • Enhanced ke

MONTO COMMUN \$3195



Lease It with LeaseCard

ten for equipment between 500 5 53999 are based on 36 monthly pain
48—60 monthly payment are available for equipment purchases totalin
who payment needed that and reight additional fixers apply to commercia

© 1989 47st. Photo

36 Compute

To order in N.Y. State call **1-212-608-6934**

Out-of-State 1 = 80 T o

Mail Order Address: 36 East 19th Street, N.Y.C. 10003





PCM 04-11-89

Corporate Accounts Welcome

volume purchase pricing available, please call. For store locations, please see information box below.

Amí. Ami

Design & see how documents will look as you write includes dozens of professionally designed style sheets. Operates under windows environment. WYSWYG screen \$9995

Lotus. 1-2-3.

FREE

w/purchase 0.

CHRŌNOS Who What-When

Cives you a 3-way view of people projects and time Displays the people you work with, your projects and tasks Displays daily calendars, includes prioritized to-do lists. Requirements: MS-DOS, IBM & compatibles, hard disk, ST2X RAM.
\$11995

XYQUEST FOR IBM®

XvWrite III Plus New A La Carte menus make the powerful word processor the easiest to learn. Single keystroke produces menu of logical option. Runs on all IBM & true compatibles.

\$21995 First Publisher



documents into attention-publications with First Pui \$7495



Managing Your Money *11895 Kodak

Diskettes

Kodak

Microsoft

\$29995

The best integrated business program-

inquire about Microsoft's exciting promotioni

\$199⁹⁵



Your Income Tax Easy to use menu simplifies each step of tax preparation. Supports printing of RS 1040 form. Tax Alert \$4495



hensive personal income ning and preparation pro-ver 40 forms included. \$4495

RGE PROTECTOR

HEAD CLEANER

Omniview: Aspiring Multitasker Falls Short



HANDS ON

BY BARRY SIMON

I've been hooked on the context switching you get with Software Carousel for some time: it allows you to keep as many as ten applications open at once and jump between them with just a touch of a key. But of late I've yearned to go beyond Carousel's switching to true multitaskine.

I've tried several multitasking environments, but I found
them too intusive and/or too incompatible with the programs I
like to run. So I was excited by
Sunny Hill Software's Omniview, a new multitasker whose
basic philosophy is closer to my
taste. Alas, it still has too many
serious problems to become a
permanent fixture on my system yet.

The basic idea of *Omniview* is to multitask only on a full-screen basis. While I'm a fan of *Microsoft Windows*, I've no interest in running applications in

Desired Date: Useries 4.1. CC Capricht 1986. Sare Will Indicare
Edit in sing dresse, Same, Jah. Int. CC Chromos Acc.

Bus Tab, so 15 to more From Finish to Finish, I for bully, Eac to casest.

Chapter Services Comment
Frogram title
Frogram

Each Omniview partition has its own start-up card, which you fill out to determine memory use and various advanced options.

a window when they think that they have the whole screen, so I regard the full-screen orientation of *Omniview* as a virtue.

Omniview is quite easy to set up. Like Carousel, you set up individual partitions that you can toggle between once you're up and running. For each partition, you can specify whether it should run in the background

and whether it can swap to disk, as well as a few other parameters. The set of options is less extensive than that of DESQ-view but more complicated than that of a pure context switcher

like Carousel.

In the menu mode, there is a simple form to fill out for each application. The manual comes with forms filled out for 40 poo-

ar applications.

A number of software tools are provided to enable you to write powerful batch files. For example, you could spawn a new partition to copy a file in background while the foreground batch file continues.

To multitask in more than 640K, you'll need an EEMS board or LIM 4.0 memory explicitly able to swap memory below the 640K boundary. With an 80386-based computer, 386-oth-the-Max or OEMM-386 will give you this LIM 4.0 capability. 386-to-the-Max provides specific support for Omniview that will also give you virtual screens to prevent one application from bleeding through to another.

All in all, the product seems well planned. Unfortunately, it doesn't work very well. During the past few months. I've seen several released and intermediate versions of this product, and each one has had serious problems. I have not yet been able to run SideKick Plus under Omniview on my system-an IBM PC AT with an Intel Inboard and Genoa EGA. On most versions. including the latest. I've been unable to successfully run a communications program in the background. On the current edition (Version 4.11), running DOS's mono mode on a twomonitor system crashed the

This product bears watching. But at least for now, if you require multitasking, look elsewhere.

Pizazz Plus Captures Images to DTP Formats, Converts Color to Gray Scale



HANDS ON

BY JONATHAN MATZKIN

When PC Magazine first reviewed Pizazz, we described it as a "turbo-charger" for your PriSc key, because it added a whole range of image-manipulation possibilities to DOS's lowly screen-dump facility. The memory-resident utility pops up over most any text or graphies screen and allows you to capture and manipulate the image. Pizazz Plus, as it is appropriately called, looks much like its pre-decessor but adds a laundry list of new features.

To begin with, Pizazz Plus supports a much wider range of graphics standards, including VGA. There is also support for some of the high-end imagecapture systems, like AT&T's Targa board. Improved dithering and screen analysis dishering and screen analysis along Pizzaz Plus to specify a total of 16 million possible colors on color output devices or up to 256 shades of gray on monochrome printers. The package now supports a total of 220 printers. Of course, results vary according to the capabilities of a particular output device.

The package also effectively translates color images into gray scales. Results aren't of photographic quality, but *Pizazz Plus* puts out good-looking halftones on an HP LaserJet Series II.

Another major enhancement allows you to save a captured screen image in a variety of formats. Pizazz Plus stores images that will print in supported applications, such as Ventura Publisher, Microsoft Word, and WordPerfect, exactly as they

are printed by Pizzaz Plus. So a user can fuss with an image until it is ready, store it, and then print it out in the appropriate application. There are also two formats, for Publisher's Paintbrush and Spinnaker Software's Splash, that store screen-based images rather than printer image files.

Pizazz Plus builds rather nicely on the success of its useful predecessor. It helps simplify the inclusion of graphics images in desktop publishing projects.

List Price: Pizazz Plus, \$149; upgrade from Pizazz, \$59.

Requires: 32K free RAM, graphics adapter, DOS 2.0 or later. Not copy protected. Application Techniques Inc., 10 Lomar Park Dr., Pepperell, MA 01463: (508) 433-5201.

CIRCLE 456 ON READER SERVICE CARD



Omniview, Version 4.11 Sunny Hill Software P.O. Box 55278 Seattle, WA 98155-5278 (206) 367-0650 List Price: S89.95 Requires: 256K RAM, DOS 2.0 or later. Not copy protected.

CIRCLE 441 ON READER SERVICE CARD



ORACLE has led a revolution in PC relational database technology. More power. More portability. More connectivity. More reasons than ever to make

ORACLE your corporate standard database.

New tools with even more power.

We're proud to announce our newest release-Professional ORACLE Version 5.1B. Now you can run your applications in OS/2 or in protected mode above 640K in MS-DOS. So you have more room for more powerful applications. And those same applications run unmodified on almost all workstations, minicomputers and mainframes.

Version 5.1B delivers a new level of power to your PC developers including the latest versions of:

- · SOL*Forms* NEW! Enhanced 4th-generation application development environment.
- · SQL*Menu® NEW! Flexible interface builder for defining complex menu systems.

 SOL*ReportWriter™ NEW! Nonprocedural development and runtime powerhouse for producing any report.

- SOL*Plus® Oracle's ANSI-standard SQL query and administration tool.
- Pro*C™ The C-language precompiler and subroutine call interface to ORACLE.

Learn SQL on us.

Learn the language of the revolution Order Professional ORACLE today for \$1299 and we'll include ORACLE SOL*Tutor, a nine-module PC-based SOL instruction program that sells by itself for \$199.

Try ORACLE for \$199.

Our Trial Version is identical to Professional ORACLE, but can't be used in networked configurations and allows a maximum user database size of 1 MB. It's a powerful tool for prototyping your first ORACLE application. And its price can be applied to the purchase of a full Professional ORACLE license.

PATIBILITY - PORTABILITY - CONNECTABL Call 1-800-ORACLE1, ext.4431 today.

Int © 1989 by Oracle Corporation, ORACLE, SQL+Forms, SQL+Menu, SQL+Plus and S portWriter are trademarks of Oracle, Also trademarks; MS of Microsoft, OS/2 of IBM

Money-back guarantee.

If you haven't tried ORACLE yet, now there's even more reason to join the SOL revolution. More tools. More power, If ORACLE 5.1B doesn't revolutionize the way you develop PC database applications, return it within 30 days for a full refund.

Dear Orac	ie	
Oracle Direct • 1-800-ORACLE1	20 Davis Dr. • Belme 1, ext. 4431	ont, CA 9400
on my part, please : my check, or [card authorization.	noney-back guarantee ei send me the software bel VISA MasterCard Offer valid only in the U 5" High Density or 3	low. Enclosed is AmEx credi
☐ Professional OF	CACLE for MS-DOS with	free
	utor for \$1299 RACLE for MS-DOS Trial	•
Version for \$19		\$
Professional OF for \$1299	CACLE for OS/2	5
PC with MS GOS V3.1- extended memory req mended (required for 80385 PC w/ GS/2 V1	Requirements: 165-505 — 802165/6 • hard disk, 540k3 of memory and sured, 2 5MB of extended memory is 501, "ReportWhiter), 0512 – 90265, 0, hard disk, 3MB memory SQL "Riv of 05/2 and is resisced by SQL -Riv of 05/2 and is resisced by SQL -Riv	896K 90017-
	LE SQL+Tutor for \$199 ts. 256K PC with hard disk. Color	5
Subtotal		5
Please add appropr	iate sales tax	8
Total enclosed/au	uthorized (USA only)	s
NAME	TITLE	
COMPANY		
STREET (no PO boxes, pie	430)	
CITY	SMA.	7/0

TODAY'S DATE PC MAGAZINE

\$79 PC Tools Deluxe Adds Format Recovery, Disk Defragmenter, Desktop Accessories

PC HANDS ON

BY EDWARD MENDELSON

Older versions of PC Tools Deluxe resembled a Swiss Army knife. The redesigned edition-Version 5-resembles a combination hardware store. stationery supplier, and gadget

The foundation of Central Point Software's \$79 package is a traditional ensemble of disk and file utilities, now incorporated into a mouse- or keyboard-driven DOS shell that can run applications as quickly as it recovers deleted files. CPS adds a backup program, a disk

defragmenter, a format recovery program, and a custom version of the Super PC-Kwik disk cache that earned Editor's Choice in the recent PC Magazine cache roundup (February 14, 1989).

To all this, the new version adds an elaborate Desktop program, modeled loosely on the Microsoft Windows and Macintosh desktops.

The Desktop includes a miniature word processor with spelling checker, which can open 15 files at once; three calculators, including an elaborate financial one; a flexible scheduler; a simple database; an even simpler outliner; and a rudimentary telecommunications program that can transfer files in the background via Xmodem.

You can run ProKey-compatible keyboard macros that will work in the Desktop alone and also in your applications. and you can use a clipboard to transfer data from any application to another. Add to all this a file encryption program, and you'll understand why the manual fills 500 pages, not counting a 24-page addendum and a lastminute README file.

Both Desktop and shell can be run as resident or nonresident programs. As a TSR, the shell swallows as little as 9K of DOS memory while stowing the rest

PC Tools Deluxe. Version 5, adds an impressive collection of desktop utilities, including a word processor with spelling checker and a database.

of its code in EMS. The Desktop needs a mere 38K to manage all its features and let you pop them up over any application. No other program offers so much in so little RAM.

The closest rival to the PC Tools Deluxe shell is The Norton Utilities, which doesn't include a backup or cache but includes more efficient and intuitive tools for editing and managing a disk. The file editor in the PC Tools shell, for example, doesn't let you search for data in the file; Norton's makes the search effortless. But if PC Tools can't excel Norton, it generally equals it. Both packages' safe-format programs can sometimes extract data from otherwise unreadable disks Both undeleters include options that virtually guarantee successful recovery of lost files. Both defragmenters now offer a full range of choices for rearranging the contents of your disk.

But Norton has nothing to compare to the PC Tools Deluxe Desktop, which falls between Borland's SideKick and Lotus's Metro in power and flexibility and is generally easier to use than both.

PC Tools' shiny new interface uses pull-down menus, dialog boxes, and resizable, movable windows, plus modern

conveniences such as an automatically saved configuration opens each window at the location where you left it yesterday. If you use a mouse. the new interface is more efficient and elegant than the utilitarian interface familiar from earlier versions. But you may find

you need to press a few more keys if you insist on keeping your fingers on the keyboard.

The disk and file utilities stored under the shell rank among the very best. The safeformat program can sometimes extract data from otherwise-unreadable disks. The undeleter includes options that virtually guarantee successful recovery of lost files. The defragmenter now offers a full range of choices for rearranging the contents of your disk.

Backup Problems

The most problematic element of the package is the backup program, which requires too many unintuitive keystrokes for initial configuration and is fussy about the exact moment when you must insert the first disk. Although the PC Tools cache is a subset of Super PC-Kwik, the backup program doesn't coexist with the Super PC-Kwik version, and the combination produces error messages that can terrify you into thinking your backup disks are no good when in fact the data is intact.

The file encryption program uses the DES method, which is so powerful that this part of the program cannot legally be exported from the United States. But don't assume that your encrypted files are therefore secure from determined snoopers. The original form of the data remains intact on your disk and can be retrieved effortlessly with any undelete or disk-search program-including the ones conveniently included in PC Tools Deluxe. The encryption program would certainly be a lot more useful if it wiped out the original data by overwriting its

PC Tools Deluxe performs many functions impressively well, but you can get dedicated programs that perform most of its functions better. Your choice is between paying \$79 for the cornucopia of PC Tools Deluxe or hundreds of dollars for separate packages. PC Tools is without a doubt a good place to start. but you may not want to stay there.



PC Tools Deluxe, Version 5 Central Point Software 15220 NW Greenbriar Pkwy., #200 Beaverton, OR 97006 (503) 690-8090

List Price: \$79 Requires: 512K RAM (hard disk and 320K EMS recommended), DOS 2.0 or later. In Short: Every imaginable file

utility and desktop accessory in one mouse-driven or keyboarddriven package. Not copy pro-

CIRCLE 455 ON READER SERVICE CARD

How to speed up your accounting

cycle

Mhether you're shopping for your first computerized accounting system or wrestling with some other "solution", you owe it to yourself to see why Bedford's Integrated Accounting software is acclaimed as the fastest and easlest way to get your small business from transaction to report.

Quick to setup...

Installation is as easy as copying the single program file onto a working disk and typing BEDFORD.

Easy to learn...

Within minutes you will be breezing through the six fully integrated modules using only cursor and escape keys. Sample data files and a self-paced tutorial allow you to get comfortable with the program before entering your own company's data.

If you require additional help, our exclusive Comfort Guarantee provides free technical support and program updates for your first thirty days.

A snap to use ...

With Integrated Accounting you'll need to enter transactions only once.



Payroll, Payables and Receivables data are instantly transferred to General Ledger, Inventory and Jobcost as required.

On-screen lists of your chart of



Unlike other software that was never built for speed, integrated Accounting has been optimized to give your small business the boost it needs.

accounts, suppliers, customers, employees and inventory pop up automatically when needed.



Integrated Accounting topped 15 other programs to win this prestigious award

If you need your bottom line in a hurry or a quick check of a client's payment status, a few keystrokes is all it takes to display any report instantly.

Stop wasting time...

Blast down to your nearest Bedford dealer or Radio Shack Computer Center today and, for only \$249 complete, let Integrated Accounting show you the easiest way to speed up your accounting cycle.

Call 1-800-255-8361 to order.

Timeslips interface now available.

bedford.

making software comfortable CIRCLE 482 ON READER SERVICE CARD

Bedford Software Corporation • 15311 N.E. 90th Street • Redmond, WA 98052 • Fax (206) 885-0859 • (206) 883-0074

THE BUS STOPS HERE!

CompuStar: PS/2 and PC/AT Compatibility.

Ask any computer expert about what type of system you should buy nowadays and you'll likely get a "pass the bus" response. Something like — "Well, uh, the PC/AT' bus is your best buy but, then again, the new PS/2* bus may become the next industry standard." Great advice, right? If trying to decide on amicroprocessor weren't tough enough, now you're expected to pick a bus, too.

RELAX, NOW THERE'S COMPUSTAR®

The all new CompuStar from Wells American not only lets you interchange microprocessors, you can also mix and match buses — a PC/AT bus, a PS/2 bus or. . both. As your computing needs change, simply snap in a new processor or add an extra bus. You'll never again have to worry about buying the wrong computer system!

gain have to worry about ouying ong computer system! FOUR COMPLETE SYSTEMS IN ONE.

The CompuStar can be configured with any of four microprocessors — an 8086, an 80286, an 80386. St. or an 80386. The processor and up to 16 megabytes of user memory have all been combined, using the latest VLSI technology, on a single, plug-in CPU module. Plus, any time during the first year of ownership, CompuStar users can "trade-in" the CPU module they initially selected toward the

purchase of any of the other more powerful modules. *Nobody* but Wells American gives you this kind of value.

A CONVERTIBLE BUS? YOU'RE KIDDING!

No, we're not. In fact, it may well be the most practical microcomputer innovation ever. Say you've selected an AT compatible CompuStar and later want to add PS/2 compatibility. No problem! Snap in a PS/2 Bus and Adapter Module and you can use both buses in the same system. Likewise, if you've selected a PS/2 compatible CompuStar and decide you want to add

an AT bus, just snap in an AT Bus
Module. Depending on configuration, the CompuStar can have up to
13 bus expansion slots — all AT
slots, all PS/2 slots or a "splitbus" of AT and PS/2 slots. No
matter which bus becomes the

next industry "standard," you'll have peace of mind knowing your investment in a CompuStar will be protected.

The CompuStar is also easily expanded. That's because the are seven CompuStar disk/tape compartments — six accessible from the front and an additional full-height bay inside. All this in a sleek, compact tower design that will leave more room on your desktop than any of the so-called "desktop" models.

A NEW IDEA FROM AN OLD COMPANY.

The CompuStar⁸ Multi-Processor, Convertible Bus¹⁴⁰ Microcomputer. It's no surprise that our engineers invented it. After all, we've been making microcomputers longer than anyone else. . .even longer than IBM! And if that kind of experience doesn't impress you, CompuStar's service programs surely will. You can select an optional overnight module swap-out plan or on-site service from General Electric Corporation — one of the most respected names in consumer electronics. And, of course, every CompuStar carries a full one-year factory warranty.

FINALLY, AFFORDABLE TECHNOLOGY.

Think all this technology sounds expensive? It's not. CompuStar 20MHz 80286 systems start as low as \$1995†. There are also inexpensive 8086 and powerhouse 25MHz 80386 systems

available. Plus. there is a wide variety of CompuStar display, tape and disk options including a one gigabyte erasable optical disk. You can choose a factory preconfigured CompuStar or custom design one yourself.



Just unlock the front panel and literally "snap-in" a bus, CPU, memory or disk module in a matter of seconds. It's system flexibility never before available. . .at any price.

While one of our competitors (we won't mention any names) threatens you with 'missing the bus,' most simply pass the bus. Our new CompuStar, however, eliminates the bus problem altogether. Not to mention the processor problem. Even the expansion problem. Prove it to yourself. Call today about our 31-day trial offer. Oh, and by the way, the next time anytone asks, tell 'em you know where the bus stops.



Corporate Headquarters: 3243 Sunset Boulevard West Columbia, South Carolina 29169 • 803/796-7800 TWX510-601-2645 • FAX 803/796-7029

NEW ON THE MARKET

by Lori Grunin



The latest PostScript printer to pop off NEC's production line. the \$6,995 NEC Silentwriter LC 890XL, features Adobe's 68020-based Atlas controller 4MB RAM (expandable to 8MB RAM for an additional \$2,395), and an optional 20MB hard disk drive.

Primarily designed for use in multiuser and graphics-intensive environments, the printer's optional \$999 drive and new controller offer up to three times faster throughput over the company's previous model, as well as the ability to store large numbers of fonts and overlays, according to NEC.

The 8-page-per-minute printer comes with 35 resident typefaces and emulates both the HP LaserJet Series 11 and the Diablo 630 ECS

List Price: NEC Silentwriter LC 890XL \$6.995: 20MB disk drive. \$999; additional RAM, \$2,395. NEC Information Systems Inc., 1414 Massachusetts Ave., Boxborough MA 01719: (508) 264-8000, (800) 632-4636.

CIRCLE 448 ON READER SERVICE CARD

Step IVward Converts Database Application Code to dBASE IV

To ease the transition from Clinper, FoxBASE, and Ouicksilver to dBASE IV, Ashton-Tate is offering Step IVward, a program to translate the source code from applications of those database products into executable dBASE IV code.

The menu-driven utility preserves functions such as filetree processing, in-code commenting, and full printing capabilities.

List Price: Step IVward, \$89.95.

Requires: 640K RAM, DOS 3.1 or later. Not copy protected. Ashton-Tate 20101 Hamilton Ave Torrance, CA 90502; (213) 329-8000. (800) 437-4329

CIRCLE 451 ON READER SERVICE CARD

LazaGRAM Outputs 300 By 1,500 Dpi on Your HP LaserJet

The LazaGRAM, a \$695 laser beam modulator card from FX Unlimited, breaks the 300-dotper-inch resolution barrier of laser printers, providing 300 by 1,500 dpi. This enables users to output 100-line-screen, 64shade gray-scale images, according to FX Unlimited.

The card fits into the I/O slot of any Canon-based laser printer equipped with Tall Tree Systems' JLaser printer controller. LazaGRAM quintuples the number of dpi by manipulating the electrical charges sent to the printer drum, which alters the amount of toner used to generate each dot.

The LazaGRAM supports Ventura Publisher, Page-Maker and 3R2

List Price: LazaGRAM, \$695. Requires: Tall Tree Systems' JLaser printer controller, Canonbased laser printer, FX Unlimited. 4151 Middlefield Rd., #110, Palo Alto, CA 94303: (415) 494-0888.

CIRCLE 447 ON READER SERVICE CARD

19-Inch Lundy 1612 Displays 1,600 by 1,200 Pixels

For \$9,950, the Lundy 1612 color raster monitor gives demanding graphics users 1,600-(continues on next page)

Hand-held Remote Keyboard Runs Your PC from 35 Feet

If you're tired of blocking your dynamite presentations with your body, perhaps it's time for you to move to the back of the room with Presentation Electronics' SilentPartner, a \$495 hand-held, programmable remote keyboard.

The SilentPartner's receiver plugs into either the keyboard port or serial port of your PC, be it a desktop or a laptop. You program the keys of the remote using the menu-driven SProgram software, then download the information into the receiver. The remote, whose keys glow in the dark, can operate up

to 35 feet from the receiver. The remote keyboard has 23 keys, and the remaining three let you toggle between three sets of macro definitions. A single macro can hold as many as 78 keystrokes. Typically, each set of definitions, or template, will drive one application, and you can create as many templates as you want and store them for fu-

List Price: SilentPartner, \$495. Requires: SProgram software: 256K RAM, DOS 2.0 or later. Not copy protected. Presentation Electronics Inc., 3096 Wiese Way, Sacramento, CA 95833; (916) 646-3402

CIRCLE 444 ON READER SERVICE CARD



LUNDY 1612

(continued from page 51)

by 1,200-pixel resolution and an on-board 50-MHz TI34010 graphics coprocessor operating at 6 mips (million instructions per second).

Its standard 1MB of display list VRAM (expandable to 8MB) enables the monitor to display 16 colors out of a palette of 4,096 at maximum resolution, or 256 colors at an 8514/Acompatible resolution of 1,024 by 768.

by 708.
Drivers for over 100 programs, including AutoCAD,
Microsoft Windows, Harvard
Graphics, WordPerfect 5.0,
Ventura Publisher, and Page-Maker, come with the display.
Ltst Price: Lundy 1612 display.
Ltst Price: Lundy 1612 display.
System. Lundy Electronics and
Systems Inc., One Robert Ln., Glen
Head, NY 11545; (516) 671-9000.

CIRCLE 450 ON READER SERVICE CARD

Dolch Puts 25-MHz 386 Power into 20-Pound Portable

It was only a matter of time before the 25-MHz 80386 chip found its way into a portable computer, and the time has finally arrived: the Dolch P.A.C. 386-25 now brings the power of that processor to a 20-pound luggable.

The \$9,495 system, which sports the same 640 by 400 pixel Electroluminescent flat-panel

CrossView Helps Pinpoint Data Patterns

Are you going cross-eyed from poring over reams of printouts, all in the attempt to spot some meaningful relationships within your data? CrossView, a \$2.000 software package from Database International, simplifies the process of data analysis by providing quick, on-screen, n-dimensional cross-tabulations and pattern identification.

Let's say you have data on the number of widgets your firm has sold in each state for the past 10 years, who sold how many, and the amount of revenue they generated. CrossView helps you target your best or worst salespeople by region and year, by designating each item as column, row, page, or hyperpage. Changing the breakdown requires only a few keystrokes.

CrossView accepts data from DataEase, the company's database software, or in fixedfield ASCII format. Upon importing the data, the program

stores only unique values, rather than entire records, thereby compacting the dataset.

List Price: CrossView. single-user

version, \$2,000; server pack (up to six users), \$3,000; every three additional users, \$1,000. Requires: 640K RAM, DOS 3.0 or later (hard disk and color monitor—CGA or better—recommended). Not copy protected. DataEase International inc., 7 Cambridge Dr., Trumbull, CT 06611; (203) 374-8000, (800) 243-5123.

CIRCLE 446 ON READER SERVICE CARD



When creating tables with CrossView, you can specify mathematical transformations to perform on a desired item.



The Dolch P.A.C.
386-25's SCSI bus attains
data transfer rates
of up to 4 megabytes
per second,
according to Dolch.

FINELP FAEXIT FOREMOUS FIRMUPLICATE ALE-FINORE

display as the other Dolch P.A. C. luggable machines, comes with standard features such as a 19-millisecond 40MB hard disk, 4MB RAM, a 1.2MB floppy disk drive, an SCSI port, and six expansion slots.

DATELIZASZRR T1MX15:19:23

List Price: Doich P.A.C. 386-25, \$9,495. Dolch Computer Systems, 2029 O'Toole Ave., San Jose, CA 95131; (408) 435-1881.

CIRCLE 449 ON READER SERVICE CARD

Send-Off! WordPerfect and 1-2-3 Files from Your Connection CoProcessor

WordPerfect 5. 0 and Lotus 1-2-3 users who've installed Intel's Connection CoProcessor in their machines can now harness that board's ability to perform background communications with Intel's Send-Off! software add ins

The Send-Off! add-ins enable users of these applications to transmit and receive faxes and files from within either application. WordPerfect graphics, charts, and formatting and binary-format 1-2-3 worksheets can be transferred in the background, thanks to the board's 10-MHz 80188 processor.

Send-Off! is free to registered Connection CoProcessor users. The 1-2-3 add-in will be sent automatically to all board

owners and bundled with it in the future; WordPerfect 5.0 users, on the other hand, must request a copy of the software from Intel.

List Price: Send-Off! add-ins, free to registered users of Intel's Connection CoProcessor.

WordPerfect 5.0 add-in available upon request. Lotus 1-2-3 add-in will be sent automatically and

provided with all new Connection CoProcessor boards. Requires: Intel's Connection CoProcessor, Louis 1-2-3 or WordPerfect 5.0. Noi copy protected. Intel Corp., PCEO, CO3-7, 5200 NE Elam Young Pkwy., Hillsboro, OR 97124; (503) 629-7354, (800) 538-3373.

CIRCLE 446 ON READER SERVICE CARD

ASTMICRO 1-800-441-FAST

WordPerfect 5.0



List \$495

The most popular word processor is now even better than ever! Version 5.0 adds multiple font support, graphics

integration, page preview and much more. WordPerfect 5.0, still retains its feel and ease of use that made it #1. Combine this with the best support in the industry and you can't lose.

TOSHIBA T1000

The Toshiba perfect second
PC! It comes with 512K
of ram, a 720K floppy drive, a
supertwist LCD screen and MS-DOS in rom!

All this in a battery-powered 7 pound package.

A 768K ram card is just \$269 and can be set as base, expanded, or a non-volitile ram disk.

Panasonic KX-P1124

24 Pin Printer

Panasonic's new 24 pin dot matrix

printer gives you more features per dollar! It comes with paper parking and three paper paths for easy handling. The EZ-set operator panel lets you choose from five fonts, six pitches, perf cut and more. Its 11.7" carraige is perfect for envelopes or single sheets in land-scape mode. All this and a two year warranty.

	PRINTERS			Λ	ОΓ	WARE	- 1		MONITO	RS	
ALPS	LIST	FAST		II/A		WANL			Magnavox	LIST	FAST
Allegro 24	499	319		_					7BM749 VGA	229	149
Citizen		0.0	BOAR	os		The Complete PC	LIST	FAST	9CM082 VGA	649	419
120D	229	145	AST	LIST	FAST	Answering Machine	349	209	Mitsubishi		
180D	259	165	Hot Shot 286	645	339	Fax 4800	399	235	1409 RGB	399	259
MSP40	449	299	Six Pak Plus 64K	210	119	Hand Scanner 400	249	149	1410 EGA	599	399
Tribute 124	599	429	DTK			USRobotics			Diamond Scan 1381	799	479
Diconix	000	420	286 10mhz M/B	499	249	1200 Baud Internal	149	69	NEC		
150P	499	299	XT 1.2mb FDC	79	45	1200 Baud External	179	89	Multisync 2a	799	Call
Epson	400	Call	Everex			2400 Baud Internal	249	119	Multisync Plus	1399	869
Fulltsu		Odii	1200B Int Modem	149	69	2400 Baud External	279	149	Princeton		
DL3400	995	549	2400B Int Modem	249	129	Video 7			Max15	389	Call
NEC	993	349	Genoa	2.10	120	Fast Write VGA	549	335	Utitrasync	849	489
P2200	569	339	Super EGA Hi-Res+	399	169	Vega Deluxe	379	Call	Utitra 16	1375	859
P5200	799	509	Super VGA #5100	445	239	Vega VGA	499	259	Selko CM1430	995	599
P5300	1049	669	VGA Hi-Res #5200	645	359	V-RAM VGA	799	469	Sonv		
LC890	4799	Call	Hercules	040	000				1302 Multiscan	995	659
Okidata	4/99	Call	Graphic Card +	299	169	LAPTO	1PS		1303 Multiscan	825	469
182 Plus	040	219	Intel	200	109	Megahertz Modems	, 0		Zenith 1490	999	599
182 Plus 320	319 499	329	8087-2	250	149	2400B Toshiba	299	149			
390		469	80287-10	480	249	2400B NEC. Epson		1.40	DISK DR	IVES	
390	699		Above Board Plus	795	419	Mitsubishi or Zenith	399	199	Miniscribe		
393	1499	949	Orchid	795	419	Mitsubishi	000	100	40MB AT #3650	499	319
Panasonic			ProDesigner	499	299	MP-286L Dual	3195	1879	Mitsubishi	400	013
KXP1180	300	Call	Probesigner	445	269	MP-286L 20mb	4595	2449	40MB AT MR535 22m	825	399
KXP1191	400	Call	Tiny Turbo 286			NEC	4595	2449	Seagate	04.5	033
KXP1124	529	309	Twin Turbo 12mhz	645	359	Multispeed EL II	2295	1449	20MB XT Kit #225	599	267
KXP1595	749	419	Paradise		- "	Multispeed EL II	3695	2249	30MB XT Kit #238	699	287
KXP1524	949	519	Autoswitch 480	349	Call	Toshiba	3695	2249	40MB AT #251	899	349
KXP4450	2595	1499	VGA Plus	399	259				40MB AT #251-1	999	449
Star			VGA Plus 16	499	299	T1000	1249	749			
NX1000	289	169	VGA Professional	799	Call	T1200F	2099	1369	80MB AT #4096	1199	549
NX2400	499	309	Practical Peripherals			T1200FB Backlit	2399	1499	Toshiba		
NB2410	699	429	1200B Int Modem	99	65	T1200HB Backlit	3599	2399	360K Floppy	119	69
Toshiba			2400B Int Modem	199	149	T1600	4999	Call	720K 3.5" Floppy	149	79
P321SL	749	459	Prometheus			T3200	5799	3495	1.2MB 5.25" Floppy	149	79
P341SL	999	599	Promodem 2400B	199	129	T5100	7499	4495	1.44MB 3.5" Floppy	189	99
P351SX	1499	929	Promodem 2400G	249	159	Zenith		Call	Call On Non-L	isted	Items

P321SL P341SL	749 999 1499	459 599 929	Prometneus Promodem 2400B Promodem 2400G	199 249	129 159	T5100 Zenith	7499	4495 Call	1.44MB 3.5" Floppy Call On Non-	189	9
P351SX	1499	929	Promodelli 2400G	240	139	Zerini.		Oun	Call On Non-	Listec	items
Dateba	se			20	ET	WARE			Word Proc	essors	
	LIST	FAST			/	VVADE				LIST	FAS
Clipper	699	399							Ami	149	8
DataEase	600	389	Graphi	cs		Progra	mmina		Easy Extra	99	5
dBase IV	795	449		LIST	FAST		LIST	FAST	GEM First Word Plus	199	11
dBXL Diamond	199	105	Deluxe Paint II	105	67	Macro Assembler	150	89	Grammatik III	89	4
oxbase Plus	395	185	First Graphics	129	Call	Norton Guides (Spec	city) 100	58	Manuscript	495	Ca
oxbase Plus Lan	595	295	Freelance Plus	495	Call	Turbo Basic	99	60	Multimate Adv. II	565	24
Paradox	725	429	GEM Artline	495	269	Turbo C 2.0	149	90	Professional Write	199	10
RapidFile	295	179	GEM Draw Plus	299	165	Turbo Pascal 5.0	149	90	Rightwriter	95	4
Rbase for DOS	700	Call	Generic Cadd Level 3		97	Quick Basic	99	60	Sprint	195	11
Reflex	150	90	Graph Plus	495	299	Quick C	99	60	Q & A Write	199	10
A & C	349	199	Harvard Graphics	495	Call	Spread	sheets		Webster's Writer	60	4
Desktop Pub	olishina		Perspective Jr.	149	85	Allways	150	82	Word	450	C
Svline	295	175	Integra	ted		Excel	495	Call	Word Perfect	495	Č
GEM Desktop Pub.	299	169	First Choice	159	Call	Lotus	495	Call	Word Perfect Library	129	
Pagemaker 3.0	795	Call	Works	149	89	Lucid 3-D	149	79	WordStar Prof. 5.0	495	2
PFS:First Publisher	129	69	Windows 286	99	59	Quattro	248	149			
Publisher's Paintbrush		149	Windows 386	195	117	Utili	Ities		Call On Non-L		
/entura 2.0	895	489	Mice			CoreFast	149	71	TERMS: Most Orders Sh	p Within	48 hours. 1
Financi	al		Logitech C7 Serial/Bus	119	65	Desklink	170	95	Charge for Visa or MasterCa charge: 3% (Min. \$4). Prod	rd. Shippir	ng & handli
ledford Integr. Acct.	249	139	Logitech HiRes Bus	150	79	Desgview	130	73	clasms are handled by the man	sufacturer.	All returns
PI		Call	Microsoft Serial/Bus	150	95	Fastback Plus	189	99	subsect to 15% restocking fee	call for R	A number.
omputer Associates		Call	Microsoft W/ Windows		129	FastTrax	60	37	returns on used items. Sorr	, no COD	s. Person
AC 3.0	99	59	OmniMouse	89	45	Formtool	95	54	company checks delay ship guaranteed. APO's add \$15 p	ping. Corr	ipatibility
AC Payroll 3.0	99	59	PC Mouse II Serial/But	149	82	Laplink Plus	140	77	subject to change. AZ orders	add 6.7%	tax
ollars & Sense	179	99	Power Pro	tection		Norton Advanced	149	74	For your protection, we chec	k for stoles	n credit ca
lanaging Your Money	199	117	Curtis Ruby Plus	115	59	PC Tools Deluxe	80	36	Mailing Address:		
eachtree Complete II	199	149	Datasheild 85	90	50	Sidekick Plus	195	119	3721 E. Grove St., Phoenix, To place orders only call: 8	AZ 85040	70
urbo Tax 1040	75	42	Datasheild 100	99	57	XTree Pro	129	61	To check on an order call:	602.437.8	975

\$495 Employee Handbook Maker



PA HANDS ON

BY BRUCE BROWN

KnowledgePoint's \$495 Personnel Policy Expert takes the pain out of creating employee handbooks. The menu-driven package prompts you to answer questions about your company's policies on such topics as sick leave and termination, then produces a manual based on your answers. Text screens explain your options in depth.

Personnel Policy Expert's editor uses WordStar-like cursor-movement commands with pull-down-menu operations. You can also use your own word processor if you prefer. KnowledgePoint will print and bind your handbook for a fee, but you can print the ASCII format text on any printer, adding such attributes as boldface and underlining, or you can create an on-line manual

To put the product to the

book for my own small company. I created a complete employee handbook in about 6 hours-on a 4.77-MHz XT with an 80-millisecond hard disk



Personnel Policy Expert creates an employee handbook based on your answers to questions about such topics as preemployment physical exams.

And that time included my reading every text screen.

Although written for the whole U.S. market, the package is based on California law, so your handbook should be reviewed by your attorney.

For any small business, human resources department, or management consultant (a consultant version is available for an additional \$1,000), Personnel Policy Expert is a time-saying, easy-to-use tool. It's also an impressive, practical application of AI-like software. List Price: Personnel Policy Expert Version 1.0 employer version, \$495; consultant version, \$1,495. Update subscription for 1 year, \$95; for 3 years, \$195. Regulres: 512K RAM, DOS 2.1 or later. Not copy protected. KnowledgePoint, 1311 Clegg St., Petaluma, CA 94952: (800) 727-1133.

CIRCLE 431 ON READER SERVICE CARD

Practical Programming Guide for OS/2



BOOK REVIEW

BY ROBERT L. HUMMEL

OS/2 Programming: An Introduction, by Herbert Schildt, provides just the right mix of a clear tutorial, practical programming examples, and a reference guide to bring you up to speed on OS/2.

OS/2 Programming: An Introduction doesn't force you to wade through chapters on how neat OS/2 is before getting practical. Whether you're an experienced C programmer looking to write programs for OS/2 or a nonprogrammer who needs to know the basic facts, this book gives you the essentials without the hype.

You can safely skim or skip the first chapter's overview of the Intel 80x86 family architecture and the history of DOS and OS/2. The book gets down to serious programming in chapter 2, where Schildt presents C code you can compile and run under OS/2 immediately. With this hands-on experience you get a sense of real accomplishment. More important, you're motivated to study the explanations that follow.

In his next ten chapters. Schildt covers advanced topics like keyboard monitors and dynamic-link libraries in the same clear, straightforward manner, As you become more experienced, you'll find the many tables in the book useful for reference. And, as a bonus for the really ambitious, a section on programming for the OS/2 Presentation Manager graphical interface is included

Learning to program for OS/2 isn't easy. But OS/2 Programming: An Introduction makes the task more pleasant and can save you hours of frus-

List Price: OS/2 Programming: An Introduction, by Herbert Schildt, \$21.95; with companion disk. \$24.95. ISBN: 0-078-81427-8. Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; (415) 548-2805.

CIRCLE 432 ON READER SERVICE CARD

Smart ASCII Imports for Ventura Publisher



HANDS ON

BY EDWARD MENDELSON Vtune is the ASCII-import filter that should have been built into Ventura Publisher. Emulation Technologies' \$99 utility is a pricey but convenient addition to the bag of tricks that Ventura uses when importing text that's been prepared in other word processors or text editors. Vtune appears on the Load Text/Picture menu along with Ventura's native import filters, but it has options and features that none of the other filters offer.

Vtune converts ASCII text intelligently and according to your exact preferences. If you type (c) in your text. Vtune can convert it into the copyright symbol-and it does the same for the registered and trademark symbols. It can convert three periods into a correct ellipsis.

Viune removes extra carriage returns between paragraphs, and it even converts those annoving ASCII files with carriage returns at the end of each line. If you want to convert any sequence of two spaces into an en space or three spaces into an em space. Vtune will do it

automatically. It can convert different combinations of dashes or underlines into en and em dashes and change fractions typed in the form 7/8 into any typographic style of case fraction that your printer supports. You also get more-intelligent and -flexible conversions of dashes and quotation marks than Ventura provides.

With luck, you won't need Vtune with the next version of Ventura Publisher, Meanwhile, it's an indispensable timesaver. List Price: Vtune, \$99. Requires: Ventura Publisher, Version 1.1 (with Patch 2) or 2.0. Not conv protected. Emulation Technologies Inc., 1501 Euclid Ave., Cleveland, OH 44115; (216) 241-1140.

CIRCLE 433 ON READER SERVICE CARD

Through Basic training: Graduate to Turbo Pasca

Turbo Pascal® is easy to learn. fast, powerful, and the most popular Pascal compiler in the world

When you graduate from Basic to Turbo Pascal, you have entirely new freedoms and powers. Modern, modular programming for one. Basic doesn't support that. Complete control over your computer's memory is another. Basic doesn't give you that.

Turbo Pascal's .EXE files are streamlined and fast, just like the pros'. And Pascal doesn't promote

Basic flaws like "GOTO" that lead to spagnetti code. None of which matters as much as the spectacular difference

Turbo Pascal makes to the size and speed of your programs. Basic is big and slow. Turbo Pascal is just the opposite.

You'll like Turbo Pascal 5.0's environmental impact

With Turbo Pascal, you're in a completely integrated environment that includes source-level debugging. You can step code, watch expressions, change variables and set breakpoints. Edit, compile, run and debug.

You are not alone

We're here to help-whether on CompuServe, by phone to Tech Support or through User Groups. Borland revolutionized programming languages, made Pascal the worldwide favorite. and we're committed to supporting you. Our manuals and tutorials-unlike most others-are clear, concise, and thoroughly professional.

We also offer an extended family of Turbo Pascal Toolbox programs including source code: Runtime Library, Database Toolbox, Graphix Toolbox, Turbo Pascal Tutor, Editor Toolbox, Numerical Methods Toolbox, and GameWorks, Borland is the Pascal one-stop shop.

60-Day Money-back Guarantee.*



Turn pro for only \$250 with new Turbo Pascal Professional

This special package-Turbo Pascal Professional-includes everything you need for professional programming in Pascal.

- New Turbo Pascal Version 5.0
- · New Turbo Debugger
- New Turbo Assembler

Turbo Debugger, recent recipient of PC Magazine's Technical Excellence Award in the development tools category, lets you debug any size program

and have up to 12 views of your code. Turbo Assembler is much faster than MASM and more compatible with MASM than MASM is with itself. Turbo Pascal Professional: it's nothing but the best.

A fast look at 5.0

- New source-level debugger
- 34.000 lines a minute on PS/2 Model 60
 - RAM-resident context-sensitive Help
- - Demand Overlays
 - EMS support Senarate compilation by Units

Forget the Basics for only \$149.95

Ready to move onward and upward from Basic? You can make easy entry to Pascal with 5.0 for only \$149.95.

And if you're a current Turbo Pascal 4.0 user, you can upgrade to the new version 5.0 for \$49.95.** To upgrade only call (800) 331-0877, or for the dealer nearest you, call (408) 438-5300.



Corel Draw! Combines Power, Simplicity



HANDS ON

BY LUISA SIMONE

In a software category where powerful features and ease of use have historically been mutually exclusive on the PC, Corel Draw! stands as an exception. This new vector-based drawing package truly deserves the exclamation point that rounds out its name.

The first thing you notice when you open Corel Draw! is that the screen isn't cluttered. In fact the toolbox, which runs down the left of the display, contains only nine icons—and only three of those are actually drawing tools.

At first, this may seem to be a drawback. But you soon discover that you can achieve sophisticated, professional-looking drawings without lots of icons, gizmos, menu choices, and dialog boxes.

Where other drawing packages give you four different tools for drawing four different types of lines, Corel Draw', gives you a pencil. If you click the mouse button and release it, and then move the mouse and click again, the program assumes you want straight lines. If you move the mouse while holding the button down, the program assumes you want curves.

Moreover, Corel Draw! decides how best to fit the curves to the movements you've made. By having the program do the hard work—like deciding whether a cusp curve is better than a symmetrical curve—the act of drawing becomes easier.

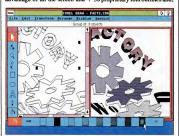
Of course you can edit any straight line or bezier curve. In fact, double clicking on a curve pops up a special menu to do just that.

The power of the tools makes special effects incredibly easy. For most special effects, it isn't even necessary to go to a menu. Double-click with the Pick tool turned on and, bingo, you can rotate or skew objects to simulate 3-D. Text can appear to be lying flat on a page. Creating a mirror image of an object

requires exactly two mouse clicks and one keystroke. To tint a circle so that it looks like a sphere, you simply choose the Radial Fill option from the tool-

Corel Draw! runs under Microsoft Windows and takes advantage of all the screen and character mode. It's fast because you don't have to kern and justify type on the fly. And it's logical because the same window contains all of your type spees for that piece of copy.

The package includes about 50 proprietary font outlines and,



To avoid slow screen redraws, Corel Draw! presents a wire view for drawing creation and editing. A separate preview window lets you see the finished result.

printer drivers available in Windows—including Post-Script printers and the HP LaserJet. However, this product isn't entirely Windows kosher. I found that the screen sometimes failed to redraw properly—especially if I printed a file at a reduced percentage.

The program uses the windowing environment to segregate your working wire frame drawing from an on-screen WYSIWYG preview. It's a trade-off. The wire frames, which represent only the outlines of objects, are redrawn very quickly, but the preview window eats into precious screen space. I can't say that I liked the trade-off, but I found it workable.

Core! Draw! uses a similar windowing method to much better effect for text entry. Anyone who has ever typed a text correction into a WYSIWYG program knows how frustratingly slow the process can be. Core! Draw! brings up a separate dialog box that lets you enter a text string of up to 250 characters in—you guessed it—

though the names are unfamiliar, the letter forms themselves closely resemble standard Adobe typefaces.

The text handling features are nothing short of elegant. You can assign special attributes, like typeface and point size, to individual characters within a text string. You can convertext into curves and then edit the outlines to suit your fancy. You can rotter and skew text or fit it to a curved path. These features rival those of some of the best freehand drawing programs on the Mar.

The feature list goes on (and on). Corel Draw! can automatically trace a scanned, bitmapped image. I was able to trace a complex outline of Chinese calligraphy from an imported .PCX using two simple tools—Pick and Shape.

In addition, Corel Draw! makes it painless to change the line width and color attributes of the drawing tools. You can, for example, simulate pen nibs of different shapes by altering the rotation of the line. Objects can be filled with patterns or with

color. Corel Draw! accommodates both the Pantone Matching System (PMS) and the 4/c process model (CYMK).

Only one change could make these customization options better: the ability to save one or two (or three or four) favorite custom tools so that they would be available as menu choices.

avariation as menu crotices.

Corel Draw! imports and exports files in many useful formats, including .PCX, .TIF, Windows Metafiles (.WMF), and Encapsulated PostScript (.EPS). However, the addition of the .CGM and HPGL formats couldn't but?

My only serious problem was a bug in the program. Take my advice and never include the end nodes of a line when you convert straight lines to curves—the program crashes every time. The tech support staff at Corel Systems was aware of the bug and assured me that a fix is on the way.

I suspect that illustrators, ard directors, and desktop publishing mavens will be the most likely candidates to use Corel Draw!. But, by concentrating not only on the quality of the besier curves but also on the ease of the learning curve, this program holds out hope for all aspiring artists.



Corel Draw! Version t.0 Corel Systems Corp. 1600 Carling Ave. Onawa, Ontario K1Z 8R7 Canada (613) 728-8200

(613) '728-8200 List Price: \$495 (does not include a runtime version of Microsoft Windows). Requires: 640K RAM, Microsoft Windows 2.0 or later, Windows/286, or Windows/386; BM PC AT or compatible (2MB hard disk space); DOS 3,0 or later.

In Short: A walloping good freehand drawing program that is easy to learn and fun to use. Highly recommended. Not copy protected.

CIRCLE 443 ON READER SERVICE CARD

Power without pain.



Multi-table form dynamically displaying information from three related tables.

You don't have to be a programmer to have easy access to our highly sophisticated, powerful relational database, Paradox* 3.0.

Paradox 3.0 is all powerful and never painful because it

Weekly Software Sales

makes all the complex inside moves, you don't. While it does the complex for you, the complexity is hiden beneath clear, natural, even intuitive pathways and patterns that make life easy for you.

With Paradox 3.0, there are no Unclears, no Unknowns. You don't need an army of inhouse technical support people. And best of all, you don't have to be a programmer to be a pro with Paradox. It's all gain. no pain.

"Query-by-Example" for example

If your database experience so far is limited to the flat-file type rather than relational, or even if a

60 day money-back guarantee*

"Customer subdiction is our main concern. If within 60 days of purchase this product does not perform in accordance with our claims, call air customers and our of arrange a related. All Bosteria products are insulated an inspirated submersels of Bosteria International, so: Other is an extensional product and insulated an extensional products are insulated an extensional products and insulated and insulated an extensional products are extensional products and insulated an extensional products and insulated an extensional products are extensional products and insulated an extensional products and insulated an extensional products are extensional products and insulated an extensional products are extensional products and insu

spreadsheet is the only program you've used before, Paradox gets you up and running immediately with just a ✓.

Record-locking and Auto-Refresh make the network safely network

Paradox has become the leading networker because it handles multi-users intelligently. If someone in your group or network has accessed a record, automatic recordlocking keeps everyone else from changing it.

That way, two or more people can't change the same data at the same time. (As a bonus, Paradox also tells you who is using a record at a particular instant.)

Once the record has been changed by someone in the network, Auto-Refresh kicks in automatically and updates everything. Everyone in the network is looking at up-to-the-minute information.

Paradox, for the looks of things

Presentation-quality graphics are another Paradox distinction. They give you and your work the professional look. Paradox instantly turns your tables into graphs with

one keystroke—and in multiuser environments, with a few keystrokes your graph can show up-to-the-minute changes. Not only does everyone get the picture, they get an accurate picture.

Award-winning Paradox Family

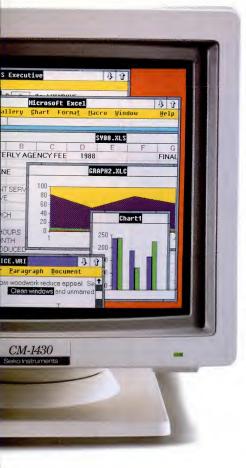
Paradox 3.0 is the latest addition to the award-winning Paradox Family. Paradox OS/2 and 386 received PC Magazine's BEST OF 1988 AWARD in the database category.



To order a trial version of Paradox 3.0 (\$14.95) or a demonstration disk (\$4.95), call (800) 345-2888, extension 100. Paradox owners may upgrade (\$175.00) by calling (800) 331-0877. (Please have your serial number available.)



BORLAND



Why Our Engineers Love Smashing Windows.

When Windows looks smashing, our engineers look happy. Because that's when their hard work really shows.

Take the CM-1430 monitor, for example. Its 1024x768 resolution lets you see more data, even when the active Window area shrinks. Use of one electron gun instead of three keeps colors intense, and in focus. Its cylindrical tube (rather than a round or flat one) makes screen edges razor sharp, and reduces glare. And, its tight 26mm dot nitch keeps lines sharp, type crisp.

Add obsolescence protection (compatibility with both VGA and 8514/A standards) and you're set for a stunning display of today's best software. As well

as tomorrow's.

The net effect is a screen unmatched in clarity, precision, and beauty. And unapproachable in value. Give us a look. You'll see how our engineers' view of technology actually improves your view of Windows. And everything else.

Call 1-800-888-0817 Ext. 100C for information and a dealer near you.



Seiko Instruments

PC UPDATE

by Paula Seefeldt

SuperCalc5 Links Spreadsheets

Computer Associates International has added spreadsheet-linking abilities to SuperCalc5, its spreadsheet program. Version 5.0 also provides auditing and debugging, improved graphics and output, and LIM 4.0 support, Super-Calc5 works with Lotus 1-2-3, enabling the user to mix commands and use 1-2-3 macros and menus. Users who subscribe to Computer Associates' SupportPlus service will receive a free upgrade. All other registered users and users of competitive spreadsheets can upgrade for \$100. New packages retail for \$495. Computer Associates International Inc., San Jose, Calif.; (408) 432-1727.

Framework III Increases Memory

Framework III, the decision-support package from Ashton-Tate, has increased its speed and provides 50K additional free memory. Version 1.1 also has an integrated thesaurus, spelling checker, direct import and export of dBASE



Framework III provides a spelling checker.

files, and data entry typing. New spreadsheet features include regional recalculation and the ability to view multiple spreadsheets simultaneously. Upgrades are free to all registered users, and new packages retail for \$695. Ashton-Tate Corp., Torrance, Calif.; (213) 329-8000.

WordStar 5.5 Adds Pull-Down Menus

WordStar, the word processing program from MicroPro International, now provides comprehensive connectivity with other packages as well as LAN and graphics support. Version 5.5 refines the Advanced Page Preview feature by allowing users to view documents on-screen and adds Systems Application Architecture pull-down menus. MicroPro is also introducing a Corporate Support Program, which includes volume purchase and site licensing agreements and separate documentation pricing. Upgrades are \$39 for users of WordStar 5.0 and \$119 for all other users. New packages are \$495, LAN upgrades from Version 4.0 are \$119, and new LAN packages retail for \$695. MicroPro International Corp., San Rafael, Calif.; (415) 499-1200.

PFS:First Publisher Incorporates DeskMate

Software Publishing has released a color-enhanced version of PFS:First Publisher, its desktop publishing package. The new version runs under DeskMate and supports VGA and the Tandy PL 1000 laser printer. Registered us-



PFS:First Publisher runs under DeskMate. ers can upgrade to PFS:First Publisher-Desk-Mate for \$45. New packages retail for \$149. Software Publishing Corp., Mountain View, Calif.: (415) 335-2080.

Dolch P.A.C. Increases Speed

Dolch Computer Systems has added a 25-MHz zero-wait-state microprocessor to the Dolch P.A.C., its 386 portable computer, for increased speed. In addition, the enhanced Dolch P.A.C. includes a 64K disk cache and an SCSI interface with an Electroluminescent flat-panel display, to provide a wide range of ambient lighting, Dolch P.A.C. retails for \$9,495. Dolch Computer Systems, San Jose, Calif.; (408) 435-1881.

AccountMate Works with dRASE IV

SourceMate Information Systems has added AccountMate, Version 2.0 Plus IV, to its integrated dBASE accounting software. Version 2.0 Plus IV provides compatibility with Ashton-Tate's new dBASE IV database language as well as dBASE III Plus. Prices for the new AccountMate modules range from \$295 to \$895. SourceMate Information Systems, Mill Valley, Calif.: (800) 877-8896.

Micrografx Designer Adds 05/2 Compatibility

Micrografx Designer now provides compatibility with the OS/2 Presentation Manager. Version 2.0 also offers automatic gradient fills. auto-trace, bezier-curve editing, and spot- and process-color separations. New Import and Export graphics filters are available, and crop bitmap and mirroring are included. Version 2.0 is free to Micrografx ETSS subscribers and to users who purchased after February 1, 1989. Upgrades are \$100 for all other registered users. New packages are \$695. Micrografx Inc., Richardson, Tex.; (214) 234-1769.

BULLDOG'S HUNTING UP DEALS FOR YOU!





COMPAQ
386 Desk Pro 40/60/130
\$3950/4895/6289
286 Desk Pro 12 mhz
Compaq II Model IV
Compag Port. 386
Model 40/1005649/7199
Compaq III 20 mb/40mb
3595/4150
Compaq 386-S model
1/20/402925/3465/3695
Compaq 386-25 110/300
7195/9395
Compaq SLT w/20 meg
90 day warranty through Bulldog
30 day warranty through building

90 day warranty thro	ugn Dunaog
IBM	_
PERSONAL SYS Model 30 w/2 floppy Model 30 w/1 floppy &	
Model 50 · 30/60 Model 60 · 40/70	.2750/345 .3295/365
Model 70 - 60 Model 80 - 40 Model 80 - 70	427
Model 80 - 115 90 day warranty throu	gh Bulldog
MATH CO-PRO	CESSOF

80387-25	\$799
80387-20	439
80387-16	385
80287-8	219
80287-10	259
80287-10 8087-3/8087-2	99/139
256K Chips/64K Chips	Call
MONITO	RS
NEC	
NEC Multisync II A.	\$519
NEC Multisync II	589
NEC Multisync Plus NEC Multisync XL 19"	879
NEC Multisync XL 19"	2199
IBM	
Mono 8503	\$209
Color Display 8512	459
Color Display 8513	559
Color Display 8513 Color 8514 PRINCETOR	1195
PRINCETO	٧
MAX12	5149
HX12 HX12E	419
Ultrasync	449
MAGNAVO	529
Amber 776 RGB80 8762	\$89
ECA OCMOES	259

COMPATIBLE

8 MHZ TURBO 1 floppy, 512K, AT style keyboard, monographics card, mono \$799 monitor tem add \$150 w/20 add \$269, w/30 mb add \$289



1 year warranty LAPTOPS Epson Laptopsli....

NEC Multispeed EL	
NEC Multispeed HD	
Toshiba 1000	
Toshiba 1200	2299
Toshiba 1200F	
Toshiba 3100	3095
T3200/T5100 37	45/4795
Zenith Super Sport 20 mb	2325
Zenith Super Sport 26 ftb Zenith Super Sport 286 20	0 mb

DRIVES Seagate 20 dmb w/contr ST225 Seagate 30 mjb w/contr ST238

\$259

279

eagate 40 mb for AT ST251-1 409 eagate 40 mb for AT ST251 349 S1251 Seagate 80 mb ST4096 CMS 5¼" ext. 360K for PS/2 CMS 5¼" ext. 1.2 mb for PS/2 Pacific Rim 5¼" ext. 360K for PS/2 575 215 239 179 for PS/2. Pacific Rim 5¼" ext. 1.2 for PS2. Toshiba 3½" 720K int. Toshiba 3½" 1.44 mb int. Toshiba 5¼" 360K int. Toshiba 5¼" 1.2 mb int. 199 89 105 Bernouli Box II 514

20 mb ext. w/card	1195
dual 20 mb ext. w/card	1769
Plus Hard Card 40	669
Plus Hard Card 20	525
Priam 60 mb AT	629
Priam 43 mb AT	469
MICE & MIS	
Microsoft Mouse w/windows	\$135

MICE & MISC
Microsoft Mouse w/windows \$135
Microsoft Mouse w/PC
paint brush. 99
Mousesystems Mouse
Logitech Mouse C7 Plus/Hi Res
69/89

199 Logitech Scan Man...



PRINTERS	
EPSON	_
LX 800 180 CPS, 30 NLQ	
LX 850 264 CPS, 54 NLQ	3
FX 1050 264 CPS, 54 NLQ LQ 500 180 CPS, 60 NLQ	- 4
LQ 500 180 CPS, 60 NLQ	- 3
LQ 850 330 CPS, 88 NLQ	. 5
LQ 950	-
LQ 1050 330 CPS, 88 NLQ	
LQ 2550 400 CPS, 108 NLO	
OKIDATA	
182 Plus 180 CPS, 30 NLQ	- 2
320/321 300 CPS, 62 NLO	
	9/4
390 24 pin 270 CPS, 90 NLQ	4

NEC

5200 5300 PANASONIC 1124

1080i Model II
1091/1092 Model II
1524
1592/1595
3131/3151
HEWLETT-PACK
Laser Series II
Desk Jet

309/615 Pacific Data 1 mg/2 mg. Pacific Data 25-N-1 IRM Proprinter X24 Proprinter XL 24 Proprinter III Proprinter III XI 6 foot parallel cable

GRAPHIC Everex Micro Enhances \$149 Genoa Super Hi Res... Genoa VGA 5100/5200 239/359

Hercules Graphics Hercules in Color Orchid 800 VGA Orchid Pro Designer w/256K Orchid Pro Designer w/256P Orchid Pro Designer + w/512K... Paradise Auto Switch 480... Paradise VGA Plus Paradise VGA Professional... STB Chauffeur HT 179 135 STB Multi Res. II 169 Vega Deluxe... Vega VGA.... Vega Fastwrite

478		Freelance Plus
PRINTERS		Framework III
EPSON		Harvard Graphics IBM Display Write IV
800 180 CPS, 30 NLO	6174	Lotus
850 264 CPS, 54 NLO		Microsoft Word 4.0
1050 264 CPS, 54 NLQ		Microsoft Excel
500 180 CPS, 60 NLQ		Multimate Advantage
850 330 CPS. 88 NLO	519	Peachtree Ii Complete
950	589	PFS Prof Write
1050 330 CPS, 88 NLO		PFS Prof File
2550 400 CPS, 108 NLO	929	Paradox 3.0
OKIDATA		R Base for DOS
2 Plus 180 CPS, 30 NLQ	229	Revelation
0/321 300 CPS, 62 NLQ		Super Calc IV 1.0
33	9/465	Symphony 12
0 24 pin 270 CPS, 90 NLQ	465	Ventura Desktop Publ Word Perfect 5.0
1 24 pin 270 CPS, 90 NLQ		Wordstar 2000 + 3.0.
2 240 CPS. 100 NLQ	439	Wordstar Pro 5.0
3 Plus 240 CPS, 100 NLQ		
3 450 CPS, 120 NLQ	993	TAPE DR
1 SL 216 CPS, 72 NLQ	460	Everex 60 m.b
1 SX 350 CPS, 100 NLQ	950	Archives 40 mb int
1 SL 216 CPS. 72 NLO	589	CMS 150 mb internal.
1 Express	389	external

399/439

315/359

1695

749

\$19

339

ARD

PE DRI \$550 m.b..... 40 mb int mb internal

Advantage II

li Complete.

SOFTWARE Aldus Pagemaker 3.0

Chartmaster

Fastback Plus

Clipper... D Base IV

Foxbase +

DBXL DBXL Enable 2.0 w/Perspective \$465 205 419

469

105

329

439

275

269 289

209

279

469 285

219

239 239

Maynstream 60 PS/2 w/card

for model 50, 60 & 80	869
MULTI FUNCT, BO.	ARDS
AST Advantage w/128K	\$229
AST Advantage Premium	

AST Advantage Premium	
w/512K	395
AST 6 Pack Plus w/384K	245
AST 5251-11 + Enhanced	559
AST Rampage 286	
AST Rampage 286-2 for	
Model 50/60	549
AST Hotshot	355
Everex Mini Magic w/o K	59
Fast 88/V20 w/Switch	
Intel Above Board + w/512K.	
Intel Above Board PS + w/512K	
Intel John and 206 /- Jonaton	

Intel Inboard 386 for PC w/1 mb Intel Above Board II Plus for PS/2 w/o K 289 Irma Board II 685 Logical Connection 256/512K

Orchid Ramquest Extra W/o I Orchid Ramquest XT/AT w/o K. Orchid Tiny Turbo 286.... Orchid Ramquest II Z w/o K. Orchid Twin Turbo

MODE	13
Everex 1200 int/ext	\$79/115
Everex 2400 int/ext	
Hayes 1200/2400	
Migent Pocket Modem	89
Practical Peripherals halt	card
2400 w/Procomm	159
US Robotics 2400/9600	
Supra Modem 2400 ext.	135

Ventel Half Card 2400 /Crosstalk 359 Ventel 1200/2400 Plus 239/359

Vega V Ram.

COMPUTER PRODUCTS

3241-E Washington Road • Martinez, Georgia 30907 For information, technical, shipping or returns call: (404) 860-7364 or (404) 860-6905

AMDEK 410W



FX-850 & FX-1050

Epson's FX printers are legendary in the computer products industry. The FX-850 and FX-1050 continue Epson's long tradition of quality, performance and reliability. Now with increased speed and advanced features, the legend grows stronger.

Paper-Handling Performance. The narrow-carriage FX-850 and wide-carriage FX-1050 are equipped with Epson's SmartPark™ feature that lets you switch paper types without removing hardware or paper.

Built-In Convenience. Epson's SelecType front control panel puts popular printer features at your fingertips.

High-Speed Productivity. Both print 264 characters per second (CPS) in draft mode; 54 CPS in Near Letter Quality.

Backed by the Leader. Like all Epson computer products, the FX-850 & FX-1050 printers are supported by a nationwide service network and backed by Epson's one year limited warranty.

EPSON

WHEN YOU'VE GOT AN EPSON, YOU'VE GOT A LOT OF COMPANY."

Epson is a registered trademark of Seiko Epson Corporation. SmartPark is a trademark of Epson America, Inc.



To Keep Costs Down. Public-Domain Software Makes Do with Plated Silver

"Platinum, a scarce and expensive metal, is used as a purifying agent in auto emissions-control equipment. The devices account for about one-third of the world's platinum demand. Platinum is also used in iewelry and computer software.

-AP story in the Missoula (Mont.) Missoulian, December 21.1988



*Excuse me ma'am - Robbl Canadian Mounted Programmers - someone here REPORT A MISSING FILE?"

But Who's Counting?

"Objects are the latest buzz word. For a long time, there was only Smalltalk, now there's a whole troup [sic] of players including Actor, Objective C and C++. So we start out this issue with a four-piece trilogy on objects: complete with theory, examples and projects. (Space is no object.)"

-Micro Cornucopia (November-December 1988)

When You Come Right Down to It. Mavbe Scroll Bars Aren't Such a Hassle

"How to get a full-page display in Ventura Publisher for \$69: By enabling your EGA/VGA board to store a full-page image of your document, The Soft Kicker gives you instant access to any part of that page. All you have to do is move your house. No more hassling with scroll

-Aristocad Inc. postcard flyer

A little knowledge is a dangerous thing: Nice try by the caption writer for the Financial Times of Canada (October 17, 1988). The phrase has previously been applied, more correctly, to Bill Gates.

Lucky for Us the Disks Aren't Copy Protected

Academic Computing, November 1988

"To qualify [for the SuperCalc5 academic upgrade], the user needs to mail the title page of his or her current spreadsheet manual, the disks themselves (or a photocopy thereof), and proof of university enrollment or affiliation to the company.

ortables work wonders these days. Clockwise, THE M from top left: Taking you • Toshiba laptop computer talks to CPUs, printers (\$1.250) Designer calculator from Texas Instruments does basics, looks chic, runs on solar in any light (\$23). • Franklin's spelling corvague at

Why PC Magazine doesn't publish recipes and decorating tips (because we're not qualified); "The Mighty Minis" article in Better Homes & Gardens (December 1988) succinctly summarizes portable computer technology.

The Cause Is Pretty Straightforward And It Has Nothing to Do with VDTs (Even Better Homes & Gardens Knows That)

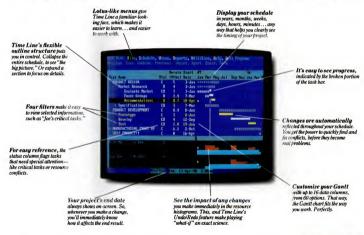
"An association between intensive VDT use and first-trimester pregnancy was established, said Michael Polen, co-author of the Kaiser-Permanente study. 'But we didn't have information to say what might have caused that.'

-Digital Review, November 21, 1988

Have you seen anything offbeat, unusual, or just plain dumb about the computer industry? If so, then send submissions to Communiqués, PC Magazine, One Park Avenue, New York, NY 10016. Contributors whose entries are used will receive \$50 and a PC Magazine T-shirt. In case of duplicate entries, the earliest postmark will prevail. Winners this issue include: Lane Coddington (platinum software), A. J. Boron (wizard of DOS), Mark Blaskey (laptop talks to CPUs), Thomas Hodges (first-trimester pregnancy), Greg Stricherz (four-part trilogy), Ken Lerner (move your house), Marc Kessler (photocopy thereof).

Next's Jobs: New tricks

from the wizard of DOS



You can't manage what you can't see. That's why virtually every aspect of Time Line's project management Gantt chart is customizable. It lets you move, shift, and redefine any aspect of the schedule to see exactly what you need. Exactly when you need it. Great Gantts. Just one reason Time Line is used by 48 of the







Fortune 50. And is rated #1, review after review. * Call for a free demo disk today. You'll see how Time Line Gantts your every wish.

FREE DEMO DISK, CALL (800) 228-4122 Ext. 565Pt

The #1 Project Manager



Graduate From Harvard.



Buy Micrografx Graph Plus and get \$100 cash back.*

In the real world you need more than just a degree to make things happen. Fast and effective communication is the key. Graph Plus™ is the answer.

If you can use a mouse, you already know how to use Graph Plus. It has more chart types, more drawing tools, and greater flexibility than Harvard Graphics. Import data from any program. Point. Click. It's quick and easy. Paste your chart into other programs, from desktop publishing

applications and word processors, to spreadsheets and databases.

Join the Harvard Graphics alumni and graduate to Graph Plus. Send us your Graph Plus registration card and Harvard Graphics, and we'll send you \$100.*

Think of it as your graduation gift.



WHAT CAN THE MAC TEACH US?



As Macintosh developers port their magic to the Presentation Manager, a look down the aisles of Macworld Expo is like gazing into a crystal ball. 1990 looks good for the PC.

I'm a glutton for punishment.
I attended the recent Macworld
Expo in San Francisco to get a fix on
the state of the Macintosh art. What I got
was a lot of abuse. Everyone who knew
me or recognized the PC Magazine logo
on my lapel had the same refrain: "Whatsamatter, Bill, have you finally found out
that computine can be fun?"

Indeed, computing on a Macintosh can be fun. It can also be cute, or tedious, or precious. But whatever else it is, it's intensely visual. Some Macintosh programs have no parallel on the PC and aren't likely to for some time to come.

One of my favorite examples is Digital Darkroom, from Silicon Beach Software. This brilliant program lets you take scanned photographic images and manipulate them to your hear's delight. You can combine, clip, burn in, dodge, hold back, sandwich, and retouch images. You can proof your handiwork on a laser printer and print it on a phototypesetter. It's one more reason why Macintosh dominates desktop publishing. But, like any other vertically oriented package, if you have to ask "What would I use it for?" you don't need it.

I also saw a number of full-motion video products, in which images from laser disks and videocassettes can be combined with computer graphics on the screen. One of the most interesting is MacroMind's Director. It offers video images combined with painted images, graphics from other programs, text, and digitized sound. It animates objects, allowing you to rotate in several axes, zoom, pan, and otherwise

make them jump through hoops. The results are presentation graphics, desktop video presentations, and instructional programs, the likes of which normally require a \$100,000 video-editing facility. Sure, there are half a dozen videodisk systems available for the PC, but none with Director's versatility or authorine capabilities.

It's become abundantly clear that no computer is a success unless it succeeds in the business market. All of the Commodore Amiga's video prowess doesn't amount to a hill of beans beyond the TV and video graphics fields, because the Amiga isn't regarded as a business computer. The Macintosh wasn't at first, either. The original 128K Mac was an incredibly limited machine, not unlike the original 64K PC. But IBM designed the PC to be expandable, whereas it took a veritable revolution at Apple to make the Mac into a business machine.

Now, with its graphical leadership,



Macintosh is the bellwether for the applications we'll ultimately see on the PC. One key area will be forms processing. Paper isn't going away. Rather than ushering in the era of the paperless office, the computer has generated far more paper than ever. But it's also revolutionizing the seemingly mundane world of forms processing. We'll soon be taking an in-depth look at forms processing in PC Magazine. Forms will be with us for the foreseeable future. So the best thing that computers can do is accommodate them. That turns out to be considerably more subtle and tricky than one might expect. The trick isn't so much to represent accurately how the form looks on the screen but to simulate how the form is actually used.

A perfect example is MacInTax, by SoftView, currently the most popular Mac-based tax package. This program starts with a reasonable simulacrum of a 1040 form on the screen. The familiar look is important; you can relate to it (with fear and loathing, perhaps) immediately. But that's where the similarity ends. A doubleclick almost anywhere on the form gets you help about that part of the form. You document entries that are actually subtotals of other figures in windows that open up to show you itemization sheets or other parts of the form. MacInTax performs validity checks so that you can't, for instance, take a spouse-related deduction if you've checked "single" elsewhere on the form.

To date, much of the forms-processing software has centered on scanned images of existing forms and making the blank areas editable on the screen. SoftView

RAM-Resident"

Remove, Replace, Even Deactivate RAM-Resident Programs Without Rebooting Your System!

If you use RAM-resident programs such as spell checkers, desktop organizers,

The problem is managing them. Some

create memory or keyboard conflicts and

that you can't use anything else. PopDrop

solves these problems by allowing you to

actually remove, replace, even deactivate

generation" RAM-resident programs like

and VCache. And PopDrop also allows

Sidekick Plus, WordPerfect Library

easy removal of popular network software.

Voted one of "The Best Of The Best

Utilities" by PC Magazine, PopDrop is

PopDrop will support expanded memory (EMS), so you can manage the "new-

RAM-resident programs-without

rebooting your system!

an invaluable PC tool.

therefore can't be loaded with others. while some gobble up so much memory



ment system with power and flexibility while occupying only 0.6K for the

Other products gobble up to 40K of your

first layer and 0.2K for additional layers. PopDrop Keeps Tabs

print spoolers and keyboard macros, you know these "pop-up" programs provide On Your Memory Usage convenience and enhance productivity.

Our unique "PopView" screen feature displays exactly how much memory is being used-you'll never see another "Insufficient Memory" message.

p Super 2 007783 REP Best 3-0 for Japan

The PopDrop "PopView" Screen. From here, you can see which programs are loaded, how much memory each consumes, and how much is free.

PopDrop Divides Your RAM Into "Lavers"

PonDrop works by dividing your memory into layers (up to 16), each of which may contain several progams. After loading DOS and your application programs, RAM-resident programs are loaded with these layers between them, the most permanent at the bottom, the least permanent at the top.

You can create batch files to remove lavers one at a time, or several at once.

Auditation on 5% into a risk into aissense, it is comparion with IBM PC or compatible and the PSV2, VISA, MasterCars or AMEX accepted. Add 34.50 for shipping, Florida residents add 6 percent sales lux. International orders add 310.00. Please include street address—nur PA, buxes please.

Control Your RAM

If you want to run a RAM disk, a print spooler and one or more pop-up programs most of the time, but need them out of the way to work on a large spreadsheet, you can do it easily with PopDrop. You can also "activate" and "deactivate" programs in a specified layer of RAM that may conflict with the program you're using.



BLOCPublishing 800 SW 57 III AVE, SAULD (800) 888-2562 To Order Convright 1988. BLOC Publishing Corp. PonDrop is a registered trademark of BLOC Publishing.

CIRCLE 140 ON READER SERVICE CARD

BILL MACHRONE

president Kathy Lane says, "It's much more important that a form look the way the user expects it to look than be a slavishly accurate copy of the original." She elaborates on the point, adding that the form has to act the way the user expects it to act, as well, "The 1040 is a perfect example of a form that requires you to jump around, turn it over, use different parts of the form. The computer can do that far better than paper." And so it does.

THE PC PERSPECTIVE The more obdurate among you are wondering, "What does this have to do with me? All my applications are character-based." Not for long

SoftView, for instance, already offers a Windows-based version of MacInTax. called TaxView. The Windows product is certainly a competent performer on fast machines. It's effective but somewhat slow on 8-MHz ATs and slower machines.

Products like PageMaker are virtually indistinguishable in their Mac and PC versions. Everywhere I went at Macworld Expo, people spied my PC Magazine badge and whispered, "We've got a Presentation Manager version of this in the works." Why so furtive? Because Macintosh users generally believe that PC users are a benighted lot and that developers who waste their time on the PC are turncoats.

Developers, however, are inexorably pulled toward the PC market. They see the incredible size of the installed base, the growth rate, and the increasing number of machines that are graphics-capable. This last point is the most critical. The average machine going into business today is an 80286 with VGA graphics, a meg or two of memory, and a hard disk. Yet obstacles remain. Memory is still a factor-the Presentation Manager really wants 3 or 4 megabytes, so users will still have to buy more

Once the constraints of DOS and Windows are lifted, however, the designers will be free to port applications or to use their Mac feature-sets as the templates for new, PM-optimized programs. 1990 will be the go-ahead year for the Presentation Manager, the year when the seeds planted in the Macintosh market will bear fruit.

After all is said and done, the improvement will be graphically clear.

Introducing Lucid 3-D. Version 2.0!

A Remarkable New Spreadsheet

at a Familiar **DacEasy™** Price!

Version 2.0 of Lucid 3-D is more than a bag of new features. It's a masterwork! The original Lucid 3-D captured the industry's attention with its simple to use, yet remarkable three dimensional capabilities. Last year's winner of PC Magazine's Award for Technical Excellence, Lucid 3-D is fast, even on a 256K, 8088 computer. Lucid 3-D is the super spreadsheet that doesn't require a super computer!

DacEasy is proud to produce this leading edge product. Its innovative design allows first time users to learn quickly while power users of other spreadsheets move to our advance features effortlessly. The Lucid 1.0 featured pull-down menus, optional instant command keys, multiple windows, a notepad in every cell, optional ram, total

Home Office 1987 Winner

"Lucid is

a spreadsheet for our times. It is technical tour de force in an era that seems to have forgotten how to write tight code." PC MAGAZINE "You might think that a RAM resident spreadsheet would necessarily be limited in features. We found that Lucid 3-D is anything but INFOWORLD limited in power."

"Lucid 3-D is a package that could alter the face of future spreadsheets. It offers residence, multiple windows, colour, mouse support and rapid execution."

Version 2.0 is Even More Amazing!

Lucid 2.0

has vastly improved speed of recalculation of 3-D models due to the minimal 3-D recalc. Create bar and ple charts: fine Huge multimegabyte models with complicated

en) in different directories, drives, & 3-D levels.

mouseability and both a reference and tutorial manual. These features alone make this spreadsheet a must buy at only \$99.95. It's no wonder Lucid 3-D was voted Editors' Pick for 1988 by Home Office Computing.

linking which would have taken over an hour now takes less than a minute! Version 2.0 can now accept files as big as RAM (up to 8 megabytes) with models as large as allowable disk space. Lucid 2.0 can now read and write 1-2-3 and dBase files directly.

Version 2.0 makes doing "what ifs" a pleasure! Now build your 3-D spreadsheet (the wave of the future) by linking any range of cells to another spreadsheet. What's more, do graphics instantly (includes 3-D bar charts) by just selecting a range. Customize colors for any cells, and use the enhanced text inserting library feature. Further, you can now instantly have up to nine windows of your 3-D levels showing on the screen at once. And that's not all, 38 other new features make spreadsheeting really exciting!

3-D Graphics Unlimited Spreadsheet Size Reads and Writes Lotus Files Directly 3-D Linking Of Any Cell Range

Version 2.0

Buy Lucid 3-D for only \$99.95 at all leading retailers. Upgrades to Version 2.0 are only \$35.00. For more information call us at our toll-free number!

Call Toll Free 1-800-877-8088



Perfect running

It's no contest. Funk's 1-2-3* performance software helps improve your 1-2-3 productivity better than any other software you could possibly track down.

That's because each one is in perfect step with 1-2-3. With menus and commands like 1-2-3 itself. And with

Sideways. The most widely used printing software in the world.

Sideways® has always been the one software to turn to for print-

ing spreadsheets that are too wide for your printer. It turns text on its side as it prints. So no matter how many columns you put in your spreadsheet, you get them all back out in one continuous printout. Without staples, glue or tape.

Create presentationquality printouts that look just the way you want them to. Highlightranges with bold, underlined, and expanded type. Choose from nine different type sizes, from minuscule to mammoth. Print through or skip over perforations. Add borders, change page size, adjust margins any way you like.

You can run Sideways right from your 1-2-3 or Symphony menu. Just highlight a range and print.

Plus, Sideways is the right way to print with all your other software, too. Including databases, word processors, project planners, even other spreadsheets. And it prints with all popular dot-matrix printers, as well as the Laserlet Plus Feries II.



o n lundry las last

| MART | M | M |

| Desc | 15 | 155 |

I of its transmiss that there !

I A E I SAME IN LASE !

of the limited to tent !

distribution in intel

d # lowers in long ;

diliment in 1821

distance on this

"Sideways is such a fundamental improvement in spreadsheet printing that I find it hard to imagine using 1-2-3 without it." PC MAGAZINE

InWord.

Full-function word processing that runs inside 1-2-3.



If you need to create letters, memos, or reports that include data from your spreadsheet, you need InWord."

InWord is just a keystroke away from 1-2-3. So you don't have to jump through hoops to put spreadsheet data into a document.

Create live links to data in your spreadsheet. When you change the spreadsheet, the changes appear in the document automatically.

And Inword's powerful formatting features rival the best stand-alone word processors. InWord fully supports the capabilities of your printer, whether it's a 9-pin dot-matrix or an HP Laserlet. You can mix pitch and typedaces freely, and even print in proportional type with full micro-spaced justification for the ultimate in print quality.

"Of all the 1-2-3 word processing add-ins, InWord is the cleanest, fastest, easiest to use." PC MAGAZINE





InWord

With InWord, automatic

partners for 1-2-3.

powerful functions and features that take up right where 1-2-3 leaves off.

So don't wait. Dash out to your favorite software store and ask for them by name. Or order directly from Funk Software.

The Worksheet Utilities. It brings out the power user in anyone.

The Worksheet
Utilities ™ is a
collection of powerful
tools that will change the
way you work with 1-2-3,

File Manager is a powerful disk organizer that lets you describe, catalog, archive, copy, move, erase, rename, and compress worksheets and other files, all from within 1-2-3.

Print Settings lets you see all your print settings on a single screen, create different print settings for different jobs, and select print styles like "17 pitch" and "landscape mode" from a menu customized for your printer.

Formula Editor provides a powerful environ-

ment for entering, editing, and debugging formulas, with point/shoot menus for @functions, prompting for arguments, and an on-line @function reference

manual.

Search and Replace lets you hunt through your spreadsheet for labels, values, @ functions, and cell references – and optionally replace them.

AutoSave creates periodic back-ups of work-in-progress, to guard against power failures and editing mistakes.

"Indispensable...a stunning set of utilities...the
Formula Editor is simply beyond belief." PC WEEK

Sideways is a registered trademark and The Worksheet Utilities, In Word and Noteworthy are trademarks of Funk Software, Inc. © 1988 Funk Software, Inc.

Noteworthy.

The software that remembers. So you don't have to.

Noteworthy™ is the professional cellannotation and documentation software that lets you tell the story behind the numbers, formulas and macros in your spreadsheet.

Want to remember why you put what you put in a cell? Just press the hot-key and up pops a blank note. Then type away using Noteworthy's

the hot-key and up pops ablank note. Then type away using Noteworthy's powerful built-in editor. Make as many notes as you need, each one up to 8000 characters long. Copy text from a note to a creadcheat to a support of the power propagation.

Stone Macafectaring Corp Street Mail Break-Even Analysis

use your spreadsheets need ever forget the

ters iong. Copy text from a note to a spreadsheet. From a spreadsheet to a note. Or from one note to another. It even reminds you where you put your notes. As you move through your spread-

sheet, an indicator lights up whenever you land on a cell containing a note. "The simplest, most effective, and the most customizable way to attach notes to spreadsheets."



FUNK SOF I WARE

Sideways \$69.95
Works with all versions
of 1-2-3 or Symphony
The Worksheet Utilities \$99.95

Requires 1-2-3 Release 2 InWord \$99.95 Requires 1-2-3 Release 2

Noteworthy \$79.95 ires 1-2-3 Release 2 or Symphony

To order call:

1-800-822-3865 ext. 115
Funk Software, 222 Third Street, Cambridge, MA 02142

CIRCLE 323 ON READER SERVICE CARD

ortware, Inc.

PROFESSIONAL OPINIONS.

". Clarion Professional Developer 2.0 makes . . . dBASE and R:base look tired, crotchety and limited in scope? PC WREEK

... when it comes down to the bottom line, Clarion gets our vote...we'd pick Clarion to do it all? INFOWORD

. automates the process of creating complex custom applications, ...leaving you little to do but sit around and bask in the praise your programming garners?

".it does just about anything an applications developer could wish for."

"Serious applications development is a disease. Clarion is the cure?"

". we give Professional Developer our highest recommendation. It sets a new standard for application developers? PC WEEK



In order to form your own opinion about the world's most powerful relational database and programming language, we suggest you invest in your very own edition

of Clarion's Professional Developer. Return coupon today or call and ask for the Clarion dealer nearest vou.

800-354-5444 or 305-785-4555



150 East Sample Road, Pompano Beach, FL 33064

For a Free Copy Of Our Tutorial Diskette And Introductory Material Simply Return This Coupon		
Name		
Company		
Address		
City	State	Zip
Phone ()		
Mail This Coupon To:		
Clarion Software 150 East Sample Road Pompano Beach FL 33064		

DVORAK'S HALL OF INFAMY



Sixty products have been inducted into Dvorak's Hall of Infamy. To find out how to make your product flop next year, take a look at the Seven Surefire Ways to Fail.

In 20 years, very few of the computer companies that we know and love will still be with us. Many will have zigged when they should have zagged. Many will be bought out by Microsoft or Lotus (and soon thereafter disappear from the face of the earth), and many will go out of business for reasons unknown. Success in high technology is a phenomenon few can understand and fewer can predict of the carbon for the

One way to examine the phenomenon is to look at the big losers and see what they had in common. So I decided to open Dvorak's Hall of Infamy. I've awarded prizes in three categories. Congratulations to the winners.

■ The Order of the Tin Fireplug To make it into the top tier of flops, a product had to be overhyped: declared a superproduct that would change the world. Those honored in this category are IBM's TopView, The Last One, Lightning from Borland, Jazz, Gavilan Portable, IBM PC Convertible, PCir, Apple Lisa, Convergent Workslate, Mindset computer. TI 99/4A, HP Touchscreen PC, Fortune computer, Intel 80186/80188 chips, Intel 432 chip, Zilog Z-8000 chip, National Semiconductor 32032 chip, WordStar 2000, Ovation, DEC Rainbow, VisiON, Tandy 2000, Tandy 600, DR Logo, UCSD Pascal. Valdocs.

■ The Order of the White Elephant Next comes the second tier—products that were ill-timed and flawed, but somewhat interesting. They got publicity, but no sales. Worthy of the White Elephant are: Dot Computer, Cullinet's Goldengate spreadsheet, Boeing CALC, Context. MBA, Javelin, CP/M-86, R:base Clout, Jack3, Apple III, Intel 8085 chip, IBM Portable, IBM 9000, IBM 370/PC, Savvy PC, The Xerox PC, the MAD Computer, TI Professional, Microsoft Access, Albert Computer, EasyWriter, WordStar for the PCir. Commodore PC.

■ The Order of the Dodo Bird The bottom tier includes the weird and memorable oddball flops, products in a category by themselves. These include Ir from Martin-Marietta, Dysan/Tabor 3¼-inch disk, Amdels 3-inch disk, Apple Twiggy 5¼-inch disk, Hercules InColor card, IBM's PC Cluster network, JRT Pascal, NEC V-20, Zilog's Z-800 chip, CP/M 68K, DRI Personal BASIC. IBM RT PC

I hope I haven't left out any of your favorites. Next year, of course, we'll add to this Hall of Infamy. Meanwhile, we have to look at this list (and it's a good one!) to see if we can find some common threads that determined the fate of these products.



SEVEN SUREFIRE WAYS TO FAIL: 1. Release an inferior product into

- a marketplace where a superior product is already well established.
 2. Ignore research and user preferences
- and build whatever you think people want.
- Use drugs and base your decisions on drug-induced logic.
- Design a product that you can't actually build.
- Design a product, spend all your money promoting it, and then ship it years later.
 Produce a product that neither you
- nor your marketing people can explain to anyone.
- Give an otherwise decent product a really dumb name.

There's actually an eighth rule:

Don't let anyone know about or see the product, especially the press.

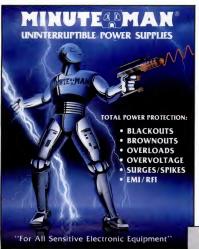
Unfortunately, the products in this latter category are the unknown flops—they make up the fourth tier. I'm sure they know who they are and have special secret award ceremonies.

I'd like to personally congratulate these charter members on their making it into the Hall of Infamy.

Now what I have to do is find a good location around Canton, Ohio, or some other little town looking to have a world-famous tourist trap, and we can start a new American institution

In the meantime, I wish all the newcomers into this business lot of good luck. And remember: if you don't succeed, you've always got Dvorak's Hall of Infamy to fall back on. The smart buy for PC Power Protection is now . . .

The Smart UPS For LAN's



Power Output	120 Volt Models	230 Volt Models
250 WATT	\$ 379.00	\$ 429.00
300 WATT	\$ 549.00	N/A
500 WATT	\$ 699.00	\$ 799.00
600 WATT	\$ 899.00	\$1049.00
900 WATT	\$1249.00	N/A
1200 WATT	\$1499.00	\$1749.00
1600 WATT	\$1999.00	\$2299.00

Suggested Retail

- · One millisecond transfer time *
- Synchronized sinewave *
- · Full one year warranty
- Order-Ship same day
 - 250 watt and 500 watt units offer 4 msec transfer time, PWM waveform

.. Reliable Protection From Data Loss



- A unique software package that interfaces your LAN's and Minuteman UPS system for an automatic and orderly network shutdown due to power failures . . . before data loss occurs!
- Compatible with SCO XENIX 2.2.3
 Compatible with Novell Systems:

 ELS 2.12 and above
 Advanced Netware 2.10 and above
 SFT Netware 2.10 and above
- Selectable power loss warning times and shutdown times
- Instantaneous user notification
- Also Interfaces to Wide Area Networks
- Auto Shutdown of UPS for unattended operation
- The only software available that supports ELS Level II
- · No Novell monitoring hardware required









1455 LeMay Drive Carroliton, TX 75007 Telephone: (214) 446-7363

1-800-238-7272

See us at COMDEX-Chicago, Booth #3033

FAX: (214) 446-9011

TELEX: 140275 OMEGA

INSIDE TRACK

RISC not, want not

The industry watchers all say that Digital Equipment Corp.'s announcement of its new workstation, which is based on the MIPS RISC chip, may signal the next direction for the desktop computer. Whether we like it or not, the RISC chip is now where it's at. At least in discussions among hardware designers. This amuses me. Since when does DEC set trends? It hasn't set one since it invented the minicomputer decades ago. But the chatter continues.

If you get the opportunity to see the RISC-based Personal Iris machine from Silicon Graphics, then you'll see why the architecture is so appealing. It's small. It's fast. Essentially the RISC chips begin life at about 10 mips, and the sky is supposedly the limit.

If RISC mania, like the sky, is about to fall on our heads, it will happen when Intel formally announces its RISC chip. code-named the N-10. Intel is still the most influential designer of microprocessors in the world. If it endorses the trend, then the trend will become official. Meanwhile. Motorola is already promoting its 88000 family of RISC chips, and then there's the SPARC from Sun Microsystems. IBM will say that its RISC-based PC led the way. What does it all mean to you and me? It means we'd better learn Unix, because the lazy vendors of RISC chips will port every conceivable flavor of Unix onto these machines, (Product idea: a Unix shell that looks like MS-DOS!)

The Carnegie-Mellon MACH operating systems joined with Display Post-Script seems to have the most appeal, bugs or no bugs. It's the combo used by Steve Job's NeXT machine and expected to appear on the newest incarnation of the IBM RT PC. (I'm told to expect a 600-dpi laser to appear with the RT.) So I went out and asked about RISC. What are its three big advantages and three big disadvantages? Three advantages: 1) fast, 2) inherently reliable, 3) easy to design a system around. Three disadvantages: 1) require sspeedy memory, 2) I/O-bound by design, 3) moves too many problems from hardware to software, where they are harder to solve.

This brings me to another question: When will software catch up with hardware? The Intel 486 is expected to ship shortly. As usual, the company is going to price the chip high and tell everyone that it's some grand superchip that will be used only in advanced workstations. As usual, every cloner in the country will implement it in a glorified desktop and show off its speed with DOS and WordStar. Already we're hearing that the 586 may be expected to appear in a year and a half. Where's the software for all these chips languishing? We're still running 8088 software on all of them. Does this bother anyone? My suggestion to Intel or anyone who has an 8088 license: Manufacture a modified 8088 chip designed as a RISC chip to run at 100 MHz. That would floor them!

While Almost on the Subject of IBM Dept.: Did anyone see the late-night TV sales of the IBM PC Convertible machines for \$499 on one of those home shopping shows? Is IBM ready to roll something new? Finally? At this writing. all the rumors indicate that the latest attempt by IBM to penetrate the portables business will be yet another machine that misses the point. Word has it that the newest machine, which gossip mongers call the portable Model 70, will have a plasma display and a battery that lasts about an hour maximum. Apparently some researchers determined that typical battery use should be calculated by taking all the Toshibas and averaging the battery life. "Let's see, the Toshiba T3100 has abattery life of nil, since it has no battery. Same goes for the T5100. We get 3 hours on a Toshiba T1000. I guess the average user needs an hour!"

Meanwhile, another rumor has surfaced claiming that IBM is replacing the PC Convertible with a full-color LCD portable that will blow everything away.

At about the same time I heard that lulu of a rumor, I discovered that, down in Atlanta, IBM had a big auction where it sold many of the Boca Raton office machines and a lot of prototype computers. Quote from a fellow who got a few of these machines: "Gee, they didn't know how to erase the hard disk. Using the Mace Utilities recovery programs I recovered most of the data." Interesting AutoCAD files, company memos, and other miscellaneous goodies were found. Gee, you'd think they'd know better.

The Lotus Three-Point-Oh Saga Dept.: I received an interesting memo on my section of the PC MagNet Editorial Forum. Supposedly Lotus is working on another version of 1-2-3 to be called 2.5 or 2.6 or something new altogether. It's designed to continue the compatibility and direction of the original product. since 3.0 seems to be headed who knows where. This project is so secret that the team is camped in Hartford. Connecticut. I think the theory is that if you force someone to live in Hartford, they'll speed up the project just so they can move out quicker. (Just kidding!) Actually. I've always wanted to use that joke about Microsoft, which is located in Redmond, Washington, near Seattle. But people up there all claim to love the place. Scientists are studying the phenomenon and figure the tap water is drugged. All I know is that columnist Steve Manes has moved to Seattle and now he smiles all the time (no kidding!) and keeps saying, "It's better than New York!" So is Hartford, Steve.

DacEasy™... Our Business **More Software & Hardware**

DacEasy Accounting™

\$99.95

More businesses worldwide choose award-winning DacEasy more than any other accounting package for solutions that are quick, simple and accurate, yet detailed and power-packed! The mark of DacEasy's excellence comes with being the only accounting software to win all magazine readers' choice awards in the past three years (such as PC World's World Class Award and InfoWorld's Readers' Choice Product of the Year), With DacEasy Accounting 3.0, fast installation means answering five quick questions and

your business can be operating in 10 minutes. A new user interface provides transaction-oriented pull-down menus for fast, accurate processing. Choose prede-







fined Chart of Accounts tailored for your service or inventory based business, or modify. Bestselling DacEasy Accounting means complete accounting - seven modules (General Ledger,



Breakthru 286 by DacEasy™

8MHz \$395 12MHz \$595

New to DacEasy's product line is the Breakthru 286 speedup board. Undeniably, Breakthru 286 is the most advanced, fastest, turbo board for your business dollar. Breakthru 286 boards provide the most cost-effective way to convert your PC so that it's faster than an AT without the expense. Breakthru is available in two clock speeds, 8MHz and also 12MHz that's 50% faster than regular Breakthru and up to 1000% faster than a regular PC. Installation of a half slot card (only five inches in length) means you don't even have to give up a full slot. And unlike competing products. Breakthru works in most clones and Compag portables. Easy diagrams show how you simply place the card in an open slot, remove the original processor and connect a single cable. It's 1-2-3 installation, and there's no software required!

With its advanced technology, Breakthru 286 replaces the CPU of the PC or XT with an 80286 microprocessor. Once installed, it's running faster than an AT. Plug in an optional 80287 math

"The Breakthru 286 performed flawlessly with every application we handed it, including copy-protected programs and nine memory-resident utilities at once." Stephen Manes, PC Magazine



DacEasy Payroll"

The world's best-selling payroll/personnel management system. Version 3.0, simply designed so that virtually anyone in the company can master its features in hours. Take time and worry out of paying employees with Payroll's ability to print continuous checks, W-2's/1099's and automatic calculations. Whether your business is large or small, DacEasy Payroll outperforms systems costing thousands more.



DacEasy Light™

More than a simple checkwriter! Designed for the home and/or sole proprietorship, comes with two pre-defined Chart of Accounts, Even if you have no accounting experience, you'll be able to reconcile bank statements, generate financials, produce invoices and statements. Light does the work behind the scenes! Fast becoming the people's choice for home/office in IBM and Macintosh environments.



Lucid 3-D™

All new, by DacEasy, version 2.0, the most incredible spreadsheet value. Simple to use (even for beginners!), yet remarkable for its three dimensional capacity and beautiful graphics. Transport accounting data into Lucid for budgets and proposals without ever rekeying. Winner of the coveted PC Magazine's Technical Excellence Award (1987) and Home Office Computing Editors' Pick.(1988)

is to Offer You Solutions. for Your Growing Business!



The World's Best-Selling Accounting

Accounts Payable, Accounts Receivable, Inventory, Purchase Order, Billing and Forecasting) in one perfectly integrated package that's so easy-to-use! Delivering tremendous speed and unequaled performance, DacEasy offers context sensitive help with expanded windows for better clarification and a new 460-page manual with primer. Fast, accurate information for multi-departmental or point-of-







"The nation's top-selling accounting program. A flexible, inexpensive package with many unexpected features. DacEasy Accounting continues to have

a lineup of extras you'd expect to find in only expensive, high end programs." PC Magazine



Accelerate Your Work with Confidence

coprocessor chip for numeric intensive applications as well. A 16K cache provides zero-wait-access to the most recently used code and data. Software compatibility is virtually universal so that all system RAM, hardware, and peripheral cards can be used without modification. Breakthru operates with LAN and mainframe communication products and conforms to the Lotus/Intel/Microsoft Expanded Memory Specification (EMS). And Breakthru board's speed switching capability even lets you decrease speed on the fly for timing sensitive applications. Experience the difference with the best executed, most reliable speedup boards in the industry. And with your board, you'll receive absolutely FREE, Lightning, a disk-caching program, (named PC Magazine's 1986 Editor's Best) that normally retails at \$69.95. "The Breakthru 286 achieved the best performance results of the caching boards tested." Ted Mirecki, PC Tech Journal (Rated #1)



Rolodex Live!™

DacEasy's newest way to save time and keep track of people, places and events at the touch of a key. For any home or office, there's never been an easier, more organized way to create. update and print Rolodex cards, custom labels and envelopes. Instant lookup (pops up over any other software) for tip of the tongue information. Bring your Rolodex cards to life!



DacEasy Word™

Here's power and simplicity in one word processing value. Version 3.0 is so simple that anyone can quickly learn to master a full feature word processor. And for more performance, Word provides windowing (up to four at one time), mail merge, word search, expanded dictionary with word option, and punctuation corrector to name a few.

See your local Dealer or 1-800-877-8088

(In Canada, call 519-747-9633)

Also ask for your FREE People's Choice catalog on the entire line of DacEasy software and hardware.



See us at Spring Comdex in

Chicago at booth #8222. *Unconditional 30 Day Money Back Guarantee on all

products bought directly from Dac Software (less shipping charges) Minimum Hardware Requirements: IBM PC or 100% compatibles. Other specifications may vary by product. *IBM, MS-DOS, Lotus, Intel, Microsoft, Rolodex and Macintosh are registered trademarks of their respective corporations. • DacEasy, Lucid 3-D, Breakthru 286 and Rolodex Livel are trademarks of Dac Software, Inc. Copy-right © 1989, by Dac Software, Inc. All rights reserved. Ask for operator #107



Sometimes, even on the best planned LAN, everybody doesn't seem to be pulling in the same direction. Getting together can be a problem.

Unless you have R2LAN™ – from the makers of CROSSTALK.

Sometimes a small change in your equipment can make all the difference.

With R2LAN, when you co-write a document, you can actually co-write it. You and your writing partner both see the same thing on your own screen, and either of you can make a change from your own keyboard—and both of you will see it immediately.

That's the kind of screen-toscreen, keyboard-to-keyboard collaboration you get with R2LAN.

In fact, Ř2LAN lets you treat any PC on the network as if it were your own, updating data files, troubleshooting, or just sharing data.

LAN's were meant to bring people together. There are greater benefits than just sharing peripherals and transferring files. At least there are if you're using R2LAN from CROSSTALK. A small change in your equipment can make all the difference.

CIRCLE 278 ON READER SERVICE CARD

R2LAN

CROSSTALK COMMUNICATIONS 1000 Holcomb Woods Parkway Roswell, Georgia 30076-2575 404/998-3998

A Division of Digital Communications Associates, Inc.
An NYSE listed company. For a copy of the annual report or further information call 404-442-4000.

CROSSTALK is a registered trademark of Digital Communications Associates, Inc. R2LAN is a trade mark of Digital Communications Associates, Inc.

THE /2nd ANNIVERSARY



IBM has done a pretty good job of nurturing its PS/2s. But Big Blue hasn't done so well with its software brainchild. Looks like OS/2 is headed for the Terrible /2s.

e're coming up on an important /2nd anniversary. On April /2, 1987, 1BM introduced both the new PS/2 line of personal computers and the OS/2 operating system. In a series of roll-out events—from a hall full of cheering dealers in Florida to a basement full of skeptical reporters at IBM's corporate offices in New York City—IBM told us that tomorrow was here and that these /2 product lines would replace what we were using at the time.

But /2 years later, DOS is livelier than ever. And the original PC bus and especially the PC AT bus (now almost universally called the "classic bus," with a tip of the hat to the marketing wizards at Coca-Cola who saved Old Coke when New Coke fizzled in the marketplace) are robust, and dominant in the market.

The progress of these product lines, and their likely futures, are /2 very different stories

PS TO U/2 Though PS/2s still can't do anything useful that can't be done with an AT-bus PC clone, PS/2 sales are no longer sputtering. And the machines are no longer klutzy, underpowered losers.

We've documented the foibles of the PS/Zs and IBM's handling of them since their introduction. We've questioned the numbers IBM reported on its shipments of PS/Zs: even when we allowed for European sales and gray-marketing, it was clear those numbers were high, or cles a lot of computers were being stacked up in someone's warehouses. And we've pointed out often that the original quartet of PS/Zs were not very smart buys, compared with the alternatives from Compaq, Dell, ALR, and a flock of other vendors.

Over the past 6 months, that's changed. PS/2s are selling well. Buyers are happy. While many of us weren't looking, IBM has fixed most of what was wrong with the line.

There was the original Model 50, hobbled by a ridiculously slow hard disk. That got fixed in the newer 502. There was the 16-MHz Model 80, which didn't deliver the kind of performance we expect from 366 PCs—especially those delivered in mini-style "tower" configurations. That got fixed with the 20-MHz Model 80, and once again with the Model 70 A21, which is a compact desktoo screams.

There was the forlorn Model 30, with the old bus and the wrong chip. That got fixed, at some loss of face, with the new Model 30 286, which returns an AT-bus machine to IBM's product line and deliv-



ers performance on a par with most AT clones—at a roughly similar price.

There was the Model 60—which we might as well forget.

And there was the Model 25, which hasn't done nearly as well as IBM expected in the home and especially in the education market, but has found a home in some other applications. I've found Model 25 on receptionists' desks, for example, as dedicated phone-list machines; in telephone-support departments of PC software firms (such as WordPerfect Corp.), where their compact size leaves room in the cubicle for something other than the computer; in PC training classrooms; and in other jobs where a cheap IBM-label PC with a very small footprint is a smart idea.

On balance, the PS/2s have worked out for IBM. Sure, it was stupid to boost the competition and lose a year and a half of desktop 286 sales by dropping the AT-bus line. Sure, screw-ups in bringing out the PS/2s probably cost Bill Lowe his job as the head of IBM's Entry Systems Division. And sure, buying a PS/2 is still an act of faith, betting on the outcome, hoping that someday Micro Channel architecture will be able to do some fancy tricks.

But there's no longer any reason *not* to buy PS/2s.

And OS/2?

A LITTLE /2 MUCH OS/2 is still mired in high costs and little value for the PC user—a fatal pairing. It has to be counted as a failure for both IBM and its development partner, Microsoft.

This may be the year that changes. But

JIM SEYMOUR

I'm skeptical: I don't think Microsoft or IBM will fix what's wrong with OS/2 anytime soon.

OS/2 is still an oddity, a very expensive way to access more than 640K RAM di-

rectly and get more than one program running at once. For most of us, cheaper paths-from Windows/386 to VM/386 to DESOview-will do just fine till OS/2 delivers real value.

What will that take, exactly?

First, it means moving OS/2 onto the 386 chip as fast as possible. IBM's insistence that Microsoft first develop OS/2 for the aging 286 chip was the biggest boner in the whole /2 saga. Maybe it was a matter of keeping the faith with buyers of the PC AT-which, when introduced in August of 1984, was touted by IBM as a machine that would be able to address the 80286 chip's full 16MB of address space directly. Just as soon as we get that new operating system. Which turned out, 4 years later, to he OS/2

Second, OS/2 has got to become a multiprocessor operating system. There's little mystery why we're not seeing multimaster/multiprocessor architecture add-in cards coming to market for the PS/2s' MCA bus: they'd need a multiprocessor operating system smart enough to know

 OS/2 is still mired in high costs and little value

for the PC user-a fatal pairing. It's a failure for both IBM and Microsoft.

how to hand off jobs to several processors. Until Microsoft writes and IBM distributes that 386-based, multiprocessor operating system-OS/X-a lot of us are going to continue to have /2nd thoughts about

jumping to OS/2. Put simply, OS/2 is still mired in reasons not to buy. If you thought my assessment of the progress of the PS/2s ("at least there's no longer any reason not to buy them") was an indictment of the kind of technological leadership IBM has provided, consider how much worse the situation is with OS/2

Today, /2 years after the first shot, IBM's little revolution is at best a stalemate. If the PS/2s have finally begun to set a meaningful new standard, OS/2 remains a nonstandard, an object lesson in the perils of poor-aim points and feeble implementation for new-technology products.



BUY ONE, GET 24 FREE.

Buy all of these cartridges separately and you would spend over \$5500. The "25 Cartridges in One!" has fonts for your LaserJet Series II printer.

A single cartridge with 103 fonts and symbol sets, 13 typefaces, and 11 sizes of type for about the cost of one cartridge.

Buy the only cartridge you need for every application. Full support included for the new high-performance word processing packages. Excellent for use with WordPerfect® 4.2 and 5.0. WordStar® Word® MultiMate® Samna™ XyWrite," Lotus 1-2-3,8 Excel® PageMaker and Windows™

PACIFIC

6404 Nancy Ridge Drive - San Diego, CA 92121 (619) 552-0880 - Fax: (619) 552-0889 Telex: 9102507881 PAC DATA CIRCLE 126 ON READER SERVICE CARD



Never before his this level of Reliability and Durability been wealable in floopy disks. Introducing the new RD Series from Missell. Twice the distribility of the disks you're new using Twice the resistance to dust and dist. And the RD Series is ten times more reliable than conventional floopy disks.

The Gold Standard his always meant meximum.







"What am I doing here?"

I guess I have a reputation for saying what's on my mind. So when the people at Everex asked me to be in their ad, I said it was okay as long as they let me have the floor.

The reason I like their Step 386/20 is simple. It's fast. It is definitely the fastest machine that I've seen so far.

When they sent the machine over, I put it through every benchmark test I could find. I finally gave up. It was the highest on all of them.

Give me the choice and I'll use the fastest thing I can get my hands on. This happens to be it.

What can I say? I like the beast.

For your nearest authorized Everex Computer Systems Reseller call 1-800-356-4283. Everex, 48431 Milmont Dr.,

Fremont, CA 94538. CIRCLE 216 ON READER SERVICE CARD

"Ai 20MHz this is the fastest beast I've ever had the pleasure to meet."

John C. Dvorak Columnist, PC Magazine

 IBM PS/2 Model 80 (20 MHz)
 3.52 MIPS

 Compaq DeskPro 386/20
 4.59 MIPS

 Everex Step 386/20
 4.91 MIPS

Power Meter MIPS Version 1.2. The Database Group.





CIRCLE 120 ON READER SERVICE CARD

bunch of products.

THE OSF'S CXI: A THORN IN IBM'S SIDE



The news that the OSF has adopted a Unix interface based on IBM's Presentation Manager is more likely to bring victory cries from Hewlett-Packard than from Big Blue.

ne might easily assume that it is a triumph for IBM that the Open Software Foundation has adopted what amounts to the "look and feel" of the OS/2 Presentation Manager. After all, IBM is one of the OSF's founders, and IBM's own flavor of Unix, AIX (based on System V, Release 2), is itself the basis for the OSF's "other" Unix.

Curiously, however, IBM played no part in the OSF's adoption of the OS/2 PM-like Common X Interface (CXI) and has shown little enthusiasm for the move. IBM didn't even propose CXI when the OSF requested a graphical user interface (GUI) technology. Rather, it was Microsoft and IBM competitor Hewlett-Packard that submitted the CXI proposal.

What's more, IBM is playing no part in the interface's implementation. Instead, engineers from Hewlett-Packard and IBM-archrival Digital Equipment Corp. are implementing CXI under the direction of the OSF staff, not only for the OSF version of Unix (the OSFI) Operating System) but for the AT&T flavor and Unix International's System V. Release 4, as well.

Isn't it strange that what seems, at least on first glance, to be an endorsement of the OS/2 Presentation Manager interface should be supported more vigorously by IBM's competitors than by IBM's After all, doesn't PM also provide the foundation for the Common User Interface for IBM's Systems Application Architecture (SAA)? Has IBM managed to get two of its chief competitors to help spread its own version of computing and preferred-user interface? Is Big Iblue coyly manipulating

events from backstage? Or are things other than they seem?

In fact, the adoption of the OS/2 Presentation Manager interface (modified slightly by the 3-D look of Hewlett-Packard's OpenView adaptation) for Unix by the OSF represents perhaps the most dire threat to IBM's industry dominance to date. Understanding why will help unravel one of the most complex and convoluted battles the computer industry has seen.

AMBIVALENCE ON STANDARDS An important point to consider is IBM's inherently ambiguous relationship to Unix. Even before that, it's useful to remind ourselves that IBM's stand on Unix is merely an instance of IBM's more fundamental ambivalence regarding standards. Were it not for requirements from customers, it is very doubtful that IBM would have anything at all to do with standardization.

It is proprietary architectures-not



standards—that have at all levels (system, operating system, and network) long given IBM the control over its customer base and the high profitability that only a semi-monopoly market can provide. The lock-in between proprietary IBM architectures and users' software investment is essential to IBM's industry dominance.

Standards of any sort threaten that dominance in direct proportion to their impact on the industry. Contrary to popular opinion, IBM is not and cannot be a low-cost producer of information-system products. Though IBM's manufacturing costs may be as low or lower than those of smaller competitors, its total costs are higher.

IBM, like the United States and Soviet governments, is a huge bureaucracy and is as likely as they to remain so, despite determined efforts to the contrary from the top. Smaller competitors with a narrower range of products and lower overhead often can, and indeed do, provide quality products profitably at much lower prices.

In addition, IBM's appetite for over \$50,000,000,000 in revenues per year cannot possibly be satisfied by a wide-open, competitive market for standardized information systems. IBM requires the semimonopoly advantage that traditional proprietary architectures provide.

MARKET DEMANDS However, IBM is also very much a marketing and market-driven company. Demand for standard solutions is a message that IBM has been getting loud and clear from its market for some time. IBM began developing Unix products only when Unix became a re-

■ WILLIAM F. ZACHMANN

quirement to win government contracts.

With Unix, as with standards generally, IBM must sail between the Scylla of losing control in the market that proprietary architectures provide and the Charybdis of not providing the standards the market demands. The result is that IBM supports standards no more than the minimum deemed necessary to respond (or at least to appear to respond) to market demands.

IBM's dilemma with Unix is how to go far enough in supporting it to be able to sell to customers who demand Unix, yet not so far as to encourage customers who might be sold proprietary IBM alternatives to consider switching to Unix.

IBM has made every effort to keep its proprietary, "mainstream" products— 3090-class mainframes, AS/400 midrange systems, and what were meant to be mostly proprietary desktop systems built on the Micro Channel architecture (MCA) and OS/2 Extended Edition (EE)—separate and distinct from its Unix (AUX) offerings. IBM claimed, contrary to obvious fact, that there was no demand in the Unix market for the Presentation Manager interface or for SAA. In this way, IBM tried to maintain the illusion that Unix is merely a niche market and that it will always remain

NICHE MARKETS PREFERRED IBM's organizational separation of the RT and AIX from the mainstream PS/2 (with

MCA and OS/2)—coincident with former Entry Systems Division president Bill Lowe's departure for Xerox—was part of the same campaign. While publicized by IBM as a "renewed emphasis on workstations," the division was at least as much an effort to keep IBM's Unix products con-

effort to keep IBM's Unix profined to niche markets.

So it's no accident that it wasn't IBM but Hewlett-Packard and Microsoft that proposed CXI to the OSF. Acceptance of the look and feel of PM by the OSF is, in fact, a dire threat to IBM. It creates an opening by which SAA applications may easily slip away from the protected world of IBM prorietary systems into what will be a highly competitive and increasingly price-sensitive world of powerful, Unix-based systems that will be capable of tak-

ing on mainframe-sized applications.
Acceptance of CXI by the OSF effectively mullifies IBM's attempt to keep Unix segregated from mainstream computing. Given that IBM's effort to move back to a more proprietary environment at the low end with MCA and OS/2 EIs aiready in trouble, acceptance of what was meant to be an IBM-only interface on Unix only makes matters worse. It simply makes it easier for IBM's competitors to take business away from Big Blue.

Break DOS's 640K Shackles!

"A top slot on anyone's software shopping list ...helps TSRs coreside in any system... HEADROOM is a grand idea..."

Winn L. Roch, PC Week, December 19, 1989

"Calling HEADROOM a memory manager is like calling Houdini a handcuff manager.

Helix Software's \$95 memory manipulator performs more death defying escapes from DOS's 640K straitjacket than any other program available.

...This is one magic act you won't want to miss."

Edward Mendelson, PC Magazine, February 28, 1989

<u>HEADROOM</u>

The New Dimension In Memory Management

Control RAM-Resident (TSR) Programs

Free all memory occupied by RAM

- resident programs
- Load or remove TSRs on the fly without leaving your application
- leaving your application

 Swap TSRs instantly to/from expanded
- memory, extented memory, or to disk
- Use TSRs' own hot-keys to pop them up
 Eliminate conflicts among TSRs and
- Eliminate conflicts among 15Ks and between applications and TSRs
 Contol up to 32 TSRs/groups of TSRs
- Display menu of loaded TSRs
- Activate and deactivate TSRs at any time
 Swap and control ANY TSRs, even key
- Swap and control ANY TSRs, even key macro programs
- Control TSRs from batch files or through the API-load, unload, reload, remove
- Pop all TSRs up at any time-even in graphic programs

All TSRs remain fully functional, but use none of your 640K memory, and HEADROOM itself uses only 50K.

Control Application Programs

- Load up to 32 applications simultaneously
 Hot-Key quickly (in 4 seconds on an AT) from one program to another
- Set up any hot keys for your programs
 Switch between any applications, even
- Switch between any applications, even graphics and mouse driven programs,
- Reload programs from their saved
- memory image

 Switch programs from a batch file or API
- Re-boot any application partition without affecting others
- Display menu of loaded applications
 \$95.order now: 1-800-451-0551 in NY

\$95.order now: **1-8UU-451-U55** In NY (718) 262-8787 9am to 5pm EST; (\$5 per order shipping, \$20 outside U.S) VISA,M/C,COD,or write to us at:

SOFTWARE CO., INC.
83-65 Daniels Street - Brianwood, N.Y. 11435 - (718) 262-6787
Patent Pending

How Farsighted Executives Are

Using Their PC's For

Al Lynch

Director of Planning and Research.

JCPenney Co.

By William I. Spink For years now you've been hearing about the wonderful things personal computers will do for The Executive of the 80's-at least in theory.

But what's the reality? Can a PC help you enjoy your work more and show a greater profit, here and now? According to your peers, the answer is "yes."

"With just a few keystrokes," says Al Lynch, Director of Corporate Planning and Research for JCPenney Company, "I can screen companies, find possible acquisitions or 'scope-out' competitors. It's a real competitive edge.

Walt Casey, V.P. of Communications at ConAgra says, "I spend a lot of time each day poking into this and tracking that. It's much easier when you can immediately get the facts from a computer, rather than having to make a series of phone calls."

One of Dow Iones News/Retrieval's services, QuickSearch, is a Godsend," adds Jim Posner, a respected retail consultant. "It gives me detailed corporate reports within minutes-I don't even have to leave the office."

Instant information: the executive advantage. To lead in today's marketplace, you need information like that." Lynch says.

snapping his fingers. He recalls an example of how Dow lones News/Retrieval*—the business and financial information service from Dow Jones & Company, Inc.—gave JCPenney Company a real advantage.

Let's just say that a 'major player' in our industry was being acquired. Within a few hours we knew more about the takeover candidate than the bidder did. Honestly, we knew more than some investment bankers did.

Decision-making with the leading edge. "Then we started getting the corporate insider trading data," Lynch continues. "It showed us some things that influenced a major deal.



Walt Casey Vice President Corp. Communications



mes Posn

"This service really makes a difference in the day-to-day running of your business. It can pay for itself very quickly." Surprisingly easy.

All you need to access the service is a PC and modem. Using the service is

What can you get from your PC? Dow Jones News/Retrieval gives you. Exclusive online access to the full text of The Wall Street Journal

- · Current and historical stock quotes
- Business news as it happens 10-K and 10-Q data
- · Leading investment analysts' reports
- Complete corporate profiles Over 40 services including MCI Mail? the Official Airline Guide™ and more.

"No problem," according to Posner. There's no difficulty using the service. I ask for pointed, specific information and get exactly what I need. It's much

easier than manual research. Walt Casey agrees. "Dow Jones News/Retrieval is simple enough for anyone who's at all comfortable with computers to use it effectively from their very first

day online." Making the right decision.

There are hundreds of online information services. many offering business data. How can you pick the best one?

"It was apparent from the first step that the most useful system was Dow Jones News/Retrieval," remembers Casey. "It offers so much of the information you're looking for-from general news and stock quotes, to data on our company and industry. It was the best single source."

"Tve had other services. but Dow Jones News/Retrieval has the most useful business information in the right form," says Posner, "The time I spend 'playing' on the computer makes more money for me-and for my clients."

Now that's the fun of profit!

Get 8 FREE hours online to experience the "fun of profit" on your PC.

YES, I'm ready to experience the fun of profiting from my PC. Send me a Dow Jones News/Retrieval* Business Membership Kit, including multiple passwords, 8 free* hours of online time, a year of *Dowline™* Magazine, a comprehensive User's Guide and waiver of my first year's annual \$18 service feefor only \$49.95.

\$49.95 Business Membership Kit Bill me later	NameTitle
□ Charge to my AmExp	Company
Acct.# Exp. Exp.	City/State/Zip
Signature(required)	Computer make and model □ Please send more information.

For faster service, call 1-800-221-7700, Ext. 25D today!

Dow Jones News/Retrievai:

From Dow Jones & Company, Inc.

The information that powers today's business.™

DIN/R Membership Kit. P.O. Box 186. Drexel Hill. PA 19026-9973 "This offer expires April 30, 1990. Free time is per account. New domestic and Canadian subscribers only. Free time must be used within 30 days after recept of passworld). Some additional fees may apply on certain services. (1989 Dow lones & Company, Inc. All rights reversed (AN) Mail as registered service mark of MCI Communications Corp. The Olicial Afrine Goldes is a trademark of Oficial Afrine Goldes. Inc.

Doing Business Since 1980 A Division of CW Marketing, Inc.

LogiMouse \$60 LogiMouse wPaint Show 69 Logi Bluss Mybushisher 70 Logi Bluss W-Publisher 95 Logi Mouse wLogi Cadd 99 Logi Bluss Mouse wLogi Cadd 99 Logi Bluss Mouse wLogi Cadd 99 Logi Bluss Mouse wLogi Cadd 99 Logiflech HI-Res Mouse 69	SOFTWARE PUBLISHING First Publisher \$1 First Graphics First Choice Control First Choice First C

	SOFT	WARE	
DATA BASE	UTIL	ITIES —	WORD PROCESSORS
MANAGEMENT	1 DIR Plus \$45	Sidekick Plus	Borland Sprint \$119
AMI \$88	Allways 80	Sideways	DAC Word 3
Ask Sam 159	Brooklyn Bridge 69	Smart Key	Easy Extra
Clipper 405	Carousel 2.0	Spinwrite 45	Grandview 175
Data Ease Base 26	Copy II PC		Multimate Advantage II 275
Data Perfect 279	Copywrite 59		PFS: Professional Write 102
dBase IV	Corefast	Tornado	Total Word 239
dBase IV LAN 599	Cruise Control	Tops Flashcard	Volkswriter 4 89
DB-XL Diamond 107	DB Fast 55	Tops IBM 99	Volkswriter Deluxe Plus 57
Foxbase 386 285	Desk Link 90	Turbo Assembler DBugger 95	XY Write III + 209
Foxbase Plus 187	Desqview 69	Unlock Game Master 23	Webster
Genifer 188	Direct Access	Unlock Masterkey 55	NewWorld Writer II 53
Nutshell 123	Disk Optimizer 4.0	Who What When Where 105	Prof. Spell Checker 32
Nutshell Plus 185	Disk Technician 54	XTree	New World Thesaurus 32
Paradox 3.0 403	Disk Technician Adv 101	XTree Professional	Word (Microsoft) 179
PFS: Professional File 2.0 152	Disk Technician Plus 67	XTree Pro Network 61	Word Perfect 5.0 219
Q & A	DS Back-Up Plus	ACCESSORIES	Word Per lect Executive
Q & A Write	Fastback Plus 98		Word Perfect Library
Quicksilver Diamond	Formworks w/Fill & File 81	Copy II	Wordstar Pro Pack 5.0
R:Base For DOS 425	Fastrax 32	Option Board Deluxe \$99	
Revelation Adv 465	Grasp	MS Mach 20 Memory Plus 309	
VP Expert	H-Test Format 44	MS Mach 20 Baseboard 308	TRAINING
VP Info	Keyworks Adv	Masterpiece	Chessmaster 2100
ACCRETA ALL MAGENTINE	Mace Gold 72	Masterpiece Plus	Chuck Yeager
MONEY MANAGEMENT	Mace Utilities 47		Adv. Flight Simulator 27
Dollars & Sense w/Forcast	Microsoft Windows 286 59	Sullillasketcii 12 × 10 379	Mavis Beacon
w/Forcast \$91	Microsoft Windows 286	DISKETTES	Teaches Typing 28
Tobias	Norton Commander 43		MS Learning DOS 29
Managing Your Money 5.0 114	Norton Editor	3½ High Density (100) 349	MS Flight Simulator
	Norton Utilities 4.5 47	5½ DS/DD (100) 60	PC Logo (New Ver.) 53
CAD & ENGINEERING	Org Plus 49	51/4 High Density (100) 115	Typing Tutor IV
Design CAD	Org Plus Adv 79	Sony 3½ S/S (100) 125	DOS
Generic CAD w/Dot Plot 72	PC Fullback	3½ DS/DD (100) 145	MS DOS 3.3
Generic CAD Level 3 w/Dot Plot 119	PC Tools Deluxe 5.0 36	3½ High Density (100) 355	MS DOS 4.01
Generic CAD 3D Self Modeling 167	Print 0 79	5½ DS/DD (100) 65	PC DOS 3.3 95
Math CAD	Right Writer	51/4 High Density (100) 125	PC DOS 4.0 115
		oversign Durisity (100) 120	100004.0



MICROCOMPUTER MARKETING COUNCIL

No APD, FFO, or international orders please
Not Delivery of the Control of the Co

1-800-426-6659



SPECIALS

Microsoft PC Excel

Microsoft PC Works

Microsoft Word 4.0

\$179

Microsoft Windows 286

SOFTWARE

COMMUNICATIONS	INTEGRATED SOFTWARE	DESKTOP PUBLISHING	GRAPHICS
Carbon Copy Plus \$106	Ability Plus\$137	Adobe Illustrator/	Deluxe Paint \$60
CompuServe	Enable OA	Windows \$329	Designer
Subscription Kit19	Framework III 409	Newsmaster II	
Crosstalk XVI87	MS Works	Pagemaker 3.0 459	EGA Paint
Crosstalk Mark IV 109	PFS: 1st Choice 82	PFS: First Publisher 69	Freelance Plus 299
Direct Access47	Smart Software System 385	Publishers Paintbrush 132	Gem Draw +
Magic Mirror53	Symphony	Publishers Type Foundry 227	Harvard Graphics 2.1 255
Mirror III	Cymphony	Ventura Publishing 445	Microsoft Chart 3.0 234
PC Anywhere III62	LANGUAGES	Ventura Publishing Pro 445	News Room Professional 40
Procom +45			PC Paintbrush +69
Remote 2	MS Basic Compiler \$176	PROJECT MANAGEMENT	Printmaster Plus 28
Smartcom II	C Compiler (Microsoft) 266	Harvard	PrintShop
Smartcom III	Cobol Compiler (Microsoft) 531	Project Manager III \$349	Publishers Paintbrush 132
NETWORKING	MS Fortran Compiler 4.0 266	Microsoft Project 4.0 295	Timeline 3.0 349
NETWORKING	Lattice C Compiler 195	Superproject Expert 409	Turbo Graphix Tool Box 62
ANW/286 2.12 \$1745	Lucid 3D 65	Timeline 3.0 349	VP Graphix56
ELS II	Macro	SPREADSHEET	Draw Plus
SFT NW 286 2.12 2975	Assembler (Microsoft) 89		ACCOUNTING
NovellCall	Pascal	Cambridge Analyst \$80	
MICE	Compiler (Microsoft) 179	HAL85	ACCPAC Easy\$53
PC II Mouse w/Paint	Plan Perfect	Lotus 1-2-3 Ver. 2.01 285	ACCPAC BPI
(Buss or Serial) \$81	Quick Basic 4.0 59	Lotus Agenda 239	Bedford Accounting 135
PC II Mouse w/Autosketch	Quick C	Lotus Manuscript	DAC Easy Accounting 53
(Buss or Serial) 97	Ryan McFarlan Fortran 375	MS Excel/Mach 20 Bundle 620	DAC Easy Bonus Pack 107 DAC Easy Payroll 53
Omni Mouse	Ryan McFarlan Cobol 579	MS Multiplan 4.0	One Write Plus 2.0
Microsoft 49	Turbo Basic 62	PFS Professional Plan 51	One Write
Buss Mouse 1.095	Turbo C	Quattro146	A/R. A/P. Pavroll 117 ea.
Serial Mouse 1.0 95	Turbo C Pro	Supercalc 5 309	
Buss Mouse w/CADD 109	Turbo Pascal 5.0	Twin Advanced	Quicken
Serial Mouse w/CADD 109	Turbo Pascal Dev. Library 228	Twin Classic	Time Slips
Buss Mouse w/Windows 125	Turbo Pascal Pro	VP Planner	TimeSlips III
Serial Mouse w/Windows 125	Turbo Prolog		TimeStips Acct Link 43

FRFF

AIR EXPRESS SHIPPING
You Pay the Ground Shipping
We Pay The Air Difference

 To Piace an Order: 1-800-426-6659.
 To Follow Up On An Order: (602) 944-1037.
 Order Line Hours: Mon.-Fn. 7:00 am-6:00 pm Saturday 9:00 a.m.-1:00 p.m.

telemarf

8804 N. 23rd Avenue / Phoenix, Arizona

ORDER 1-800-426-6659

Doing Business Since 1980 A Division of CW Marketing, Inc.

The Acknowledged Leader in the Computer Mail Order Industry.

Call About the Availability of Other Products Not Listed.



PC/XT TURBO

10MHz, 640K Memory, 150 Watt PWR Supply, Keytronics Style Keyboard, 1-360K Drive, AT Style Case, Monographics Card w/parallel Printer Port, Clock Card w/Serial Port, Mono Monitor w/Swivel Tilt Base

System w/2 Drives \$787 System w/1-20 MG Drive 994 System w/1-30 MG Drive 1021

PC/386

16 MHz. 1024K Memory. 200 Watt Power Supply. Enhanced Keyboard, 1.2 MG Floppy Drive

.... \$2285 System w/1.2 Floppy & 40 MG Drive Pictured Below PC/368 -



Pictured Above PC 286 Turbo .

PC/286 TURBO

12 MHz, 1024K Memory, 200 Watt PWR Supply. 1.2 MG Floppy Drive, Enhanced AT-Style Keyboard. EGA Monitor, AT Multi I/O Card, EGA Card

System w/1.2 Floppy & 40 MG Drive

COMPUTERS

Turbo

w/640K 1 Drive

PC/XT w/360K & 2 Drives
PC/XT w/360K & 1 Drive & 20 MG 83
PC/XT w/360K & 1 Drive & 30 MG
PC 286
12 MHz Zero Wait State w/1024K,
1.2 Floppy Drive
12 MHz Zero Wait State w/1024K,

MONITORS

MIT Amber Monitor W/SW Tilt	
MIT Color Monitor	
MIT EGA Monitor	
MIT VGA Monitor	
DISPLAY CARDS	
MIT Auto Switch EGA Card	
MIT Color Card	
MIT VGA Card	
ACCESSORIES	
MIT A B Switch Box (Par/Par)	
MIT Enhanced Keyboard	

. \$95

. . 229

345 . . 355 \$139 45 229 \$31

I/O CARDS

MIT I/O Serial Clock	. \$39
MIT I/O Serial-Parallel	38
MIT Monographics Card	55
MIT AT Multi I/O	65
WIT XT Multi I/O	65
MODEMS	

MODEMS					
MIT 1200B Modem (INT) with Software				\$5	3
MIT 1200B Modern (EXT) with Software				. 7	5
MIT 2400B Modern (INT) with Software				11	9
MIT 2400B Modem (EXT) with Software				13	9

1-800-426-66

HARDWARE

PRIN	TERS	COMPUTERS	DISK DRIVES
Alps	NEC P2200 349	Amstrad	Bernoulli Box
Allegro \$345	P5200 505	PPC 640-1 \$775	10 Meg
Other Models Call	P5300 675	PPC 640-2	20 Meg
AST	Silent Writer Call	AST Model 80	40 Meg
Turbo Laser	Okidata 182 + 225	Model 140X	Beta Int, 20 MG
Brother HL-8E Lazer Call	320 309 321 439	Other Models Call	Seagate
M-1109 139	390	NEC	20 MG w/Seagate Controller 275
Other Models Call	391 609	Multispeed EL II 1479	251-1 40 MG
Citizen Printers	393 999	Multispeed HD	30 MG 1/2HT 295
Citizen Printers	Laserline 6	Toshiba T-1000	40 MG w/Controller 439
180D	New Lasers Call	T-1000 789	Other Models Call
Other Models Call	Panasonic 10921	T-1200F	Teac 1.2 MEG AT
Diconix 150		1200FB	1.2 MEG AI
150	1124	T-3100E	
Epson Printers FX850	1191	T-3200	Toshiba 3.5 Dr 720K
FX1050	Laser 4450 1610	T-5100	3.5 Dr 1.4MB
LQ500	Other Models	T-5200 6415	BOARDS
LQ850 555	Star Micronics	Zenith	AST
LX800	NX 1000 Rainbow 225	Zenith 2429 Supersport 286 3335	Hot Shot
Other Models Call	NX 1000 169	Supersport 286	Six Pack Plus w/384K 269
Hewlett-Packard Desk Jet	NX 2400 Call	Amdek MONITORS	Xformer
Laser Jet II D 3099	Other Models	210A \$80	AT Rampage 379
Laser Jet II D	Express Writer 311 385	410	VGA
Paint Jet	Page Laser	NEC	ATI
Scan Jet	Other Models Call	Multisync II 589	EGA Wonder 225
ACCESSORIES	NETWORKING	Multisync Plus 899 Multisync XL 2199	Hercules
Computer Tool Kit	Altec Passive Hub\$29	Monographic System 1289	Color Card 145
Disk Bank w/Lock 12	AQUILA 8 Port Active Hub 289	Other Models Call	Graphics Card Plus 175
Joystick	AQUILA Arcnet Card 125	Princeton	Incolor
Keyboard Drawer	SMC Mdl 120 Arcnet Card 125	Ultrasync	Intel Above Board Plus
Curtis	Novell Call	Ultrasync 16 839	Inboard 386 PC
Anti Static Mat	SCANNERS Call	Max 12 129	Inboard 386 AT
Ruby Plus 59	Complete 400 \$139	Max 15 239 Samsung Call	80287-6
Rubý Surge Suppressor 49 TARGUS	Half Page	Samsung Gall	80287-8 195
LAPPAC Portable	MODEMS	Sony 1302A 689	80387-16
Computer Case	Anchor 1200 B w/software \$59	Multiscan (1303) 545	8087-2
Computer Case	1200 EXT	Mitsubishi	Orchid Designer 800
Wyse 30 \$295	2400 EXT	Diamond Scan 12" 499	Pro Designer
50 369	Hayes 1200 279	Diamond Scan 16"	Pro Designer + 1024 × 768 . 385
KEYBOARDS 439	1200B 249	1490 599	Tiny Turbo 249
KEYBOARDS	2400B 389	HADD CADDO	Twin Turbo
Keytronics KB5151 \$119	Prometheus		Other Models Call
KB5151 \$119	1200B w/Software	20 MG	Paradise
KB5153	2400B w/Software	40 MG	Autoswitch 350
KBIOT FIUS	US Robotics	Passport 20 429	VGA + 259
N . A	Password 1200	FAX BOARDS Complete 4800	VGA Professional 475
	Courier 2400	Complete 4800 \$225 Complete 9600 389	Video-7
NVVVV	Courier 2400E 305	FAX MACHINES	Fastwrite VGA
	HST 9600 589		VGA 265
The same	SPORTSTER 2400 B	Brother 150 \$919 Sharp Call	Vega Deluxe 205 V-RAM 475
-	w/software 125	Slidip Call	V-DAW

You Pay the Ground Shipping We Pay The Air Different

1-800-426-66











OUR NEW \$249 HAND SCANNER WILL CHANGE THE WAY YOU SEE THINGS.

MORE SHARPLY. The Complete Hand Scanner/ 400™ is the easy, affordable way to add extra impact to newsletters, reports and documents.

It gives you a choice of resolution: 200, 300, even a razor-sharp 400 dpi. It scans material up to $2\frac{1}{2}$ " wide by 14" long.

And it displays the image on the screen as you scan.

FROM ANOTHER PERSPECTIVE. Our SmartScan™ software scales, rotates, crops, edits and resizes images from 10% to 200%.

IN PRINT. The SmartScan software also gives you total control of your layout.

Just scan and position your images anywhere on the page. Then add them to any of the most popular graphics, word processing and publishing programs: WordPerfect, Ventura Publisher.* PC Paintbrush + Mand PageMaker.*

AND BIGGER. For larger images, get The Complete Half-Page Scanner." You can scan an entire page in two quick passes, then combine them into one full-size image at a crisp 200 dpi. Just \$299.

Both scanners come with an easy-to-install interface card, SmartScan software, and a 2-year warranty. All you need is an MS-DOS* PC with a hard disk and a graphics card.

To find out more about the very best hand scanners you can buy, call our toll-free number today. 1-800-634-5558.

The Complete PC

521 Cottonwood Drive, Milpitas, CA 95035 (408) 434-0145 FAX (408) 434-1048.

© 1988 The Complete PC. The Complete Hand Scanner 400, The Complete Half-Page Scanner, and SmartScan are trademarks of The Complete PC, Inc. All other rames are trademarks are trademarks on other respective companies.

COMMUNICATIONS BREAKDOWN



Some organizations have 500 386 machines, 1,000 on order, and 15 six-figure consultants to link'em all together. But those aren't the organizations that call Manes.

It's the phone again. At this hour, all my friends are hard at work, and really important messages arrive via MCI Mail or Federal Express. Chances are it's a PR person with a mission, a stockbroker with time on his hands, or a synthesized voice offering me the rare opportunity to procure a coveted Intergalactic Gold Discount Card for only \$49.97 if I call back in less than 10 minutes with the correct answer to this simple question: What glamorous blonde flips the letters on "Wheel of Fortune?" (A) Eleanor Roosevelt, (B) Helen Keller, or (C) Va—

For some reason I pick up the receiver anyway. The caller is a sincere, friendly, frazzled employee of a professional organization I belong to. She has been told I know a thing or two about computers. Do I have a minute?

This, I know all too well, will be one of those 3,600-second minutes. But what the hey; it promises to be more interesting than a conversation with a customer-service rep about the great new utility software that has just decided to turn my computer into a random-pixel generator.

"One of our East Coast members," my caller informs me, "just got back from a trip out to L.A. He came back raving about this incredible service our West Coast office has now. I think they call it an on-line bulletin board?"

"Besides the fine, clear air, what exactly was he raving about?"

"Well, the way he described it, it sounded really neat. Members can send messages to each other. I think they can even pick them up whenever they want." "Amazing," I marvel.

"So our member suggested it'd be a great idea if we started one of these things here in New York for the East Coast."

BICYCLE MESSENGERS A paid consultant would delight in running up his billable hours by eliciting more information, lending a sympathetic ear, and setting forth a plethora of possibilities. As an unpaid consultant, I ask one simple question: "Who?"

"You know, so our members could exchange information and stuff."

"Apparently they have not yet been informed about an invention called the telephone."

"Yes, but he said this would let us here at the office communicate with all our members at once."

"I admit I don't read it all that often, but as I recall, we do have a monthly newsletter."



"But that has to go to press weeks before we can get it back from the printer. Then it can take days and days until the post office delivers it. This way, we could get important news out to all the members right away."

I sigh silently.

"Couldn't we?" asks the caller.

I sigh audibly. "Sure. Assuming we ever have news that's really that hot. And assuming all the members would check the bulletin board religiously. And assuming all the members have computers. And modems. Do they?"

"Oh, no, I don't think so,"

"Great. How would you feel if you were a member and there was some hot news you desperately needed to know about and you never found out about it because you din't happen to own a computer or remember to check in with the official bulletin board? Better stick to Alexander Graham Bell and bicycle messengers."

ALL-AROUND NOGOODNIK "Well, what about this idea of the members who do have computers being able to leave messages for one another?"

"Let 'em use the West Coast bulletin board. Besides, that way the members on both coasts could sort of get to know each other. You might create a new breakthrough in bicoastal relations."

"But it's a long-distance call."

"Then install an 800 number for our members."
"Oh, I don't think we could do that.

That could get really expensive."
"Wait a minute. You think running

STEPHEN MANES

your own show is going to be free?"

"Gee, I don't know."

"Are you prepared to dedicate a computer and some phone lines to this thing? They're not exactly cheap. We're talking thousands of bucks here. And then there's the time-the hours and hours-your sysop will have to spend."

"The syswhat?"

"The person who runs the bulletin board."

"Oh. I thought it'd just sort of-you know-run itself?

"Sorry. Somebody has to set it up on the computer. Then somebody has to monitor the whole thing every day. Delete old messages. Make sure the hard disk isn't full. Keep viruses from sneaking into the system. Check to make sure people aren't posting libelous messages in public areas."

"Libelous?"

a lawsuit because some member posts a message stating that Dr. X is a lying, thieving, drug-pushing mafioso, an all-around nogoodnik, and a Macintosh user?"

'That could happen?" "Sure could. Would, if you weren't

careful."

"Gee, we never thought of that."

"I kind of guessed."

"Well, that's why we called you." "How many people in the office would be able to maintain this thing, anyway?"

"What do you mean?"

"Well, who in the office has any experience with this kind of thing?"

"Nobody, really. We're not very computerized here.'

"What kind of machines do you have in the office?"

"The accounting department has had one for years. They do the payroll on it and everything. I think it's a NEC or a DEC or something?"

"The accountants don't count. What about the rest of the office?"

"The rest of the office?"

"You know: word processing, spreadsheets."

"We have some memory typewriters." I knew it all along. It's a call from An-

other World: the Real World, in which 386 is the price of a giant-size box of dishwasher detergent, dBASE is a synonym for "corrupt," and Manzi is Italian dialect for "Y'all eat up now!"

"We're thinking about buying some word processors, though," adds the caller. "One of our clerks saw some really cute all-in-one models at Sears. With a typewriter and everything. What do you think?"

I think our industry ought to figure out why its message isn't getting through to a broad range of people whom it could genuinely help. I also think unpaid consultants





COMPUTERS FROM IOWA SURPASS ALLOTHERS!

We at Gateway 2000 firmly believe that we are the best source for computers in the nation. We have over 2000 configurations available, all priced incredibly low and all backed by our unsurpassed service.



"We are very happy that our system is at the top of the stack in both price and performance, but it is your courteous service that is uncontested by the competition.'

Pierce Haviland - Kingston, NY

"Overall, I feel that your product is outstanding and your service has been excel

gren - Stonington, CT



2 Mhz 286 VGA

2 Meg 51/4"

99 3. a 28ms SCSI Drive Is/Sec DT

16 Bit VGA Board 14" VGA COLOR Monitor 1 Parallel/2 Serial Por 101 Key Keyboard MS DOS 4.01

\$2295.00

16 Mhz \$2395.00 20 Mhz \$2495.00



25 Mhz 386 VGA 4 Megs RAM

1.2 Meg 5¼* Drive 1.44 Meg 3.5* Drive

150 Meg 16.5 ms ESDI Drive 10 Mbits/Sec DTR 16 Bit VGA Board

14" VGA COLOR Monitor 1 Parallel/2 Serial Ports 101 Key Keyboard

MS DOS 4.01

\$4495.00 (Call for 33 Mhz Option)

20 Mhz 386 VGA

1 Meg RAM 1.2 Meg 51/4" Drive 1.44 Meg 3.5" Drive 80 Meg 28ms SCSI Drive 10 Mbits/Sec DTR 16 Bit VGA Board 14" VGA COLOR Monitor

1 Parallel/2 Serial Ports 101 Key Keyboard MS DOS 4.01

\$2995.00 (Upgrade to 4 Megs \$500)



Steve Apiki & Stanford Diehl Oct. 1988, BYTE Review of 20 386

- "Emerging as truly
- exceptional... · "The Gateway
 - delivers speed without sacrificing features
- The system ran without
 - "We were truly surprised to see a system of this caliber selling for less than \$3000."
 - When evaluating the whole package The GATEWAY 386 surpasses all

CIRCLE 213 ON RESIDUE

GATEWAY Gateway 2000 • P.O. Box 2000 • Sgt. Bluff, IA. 51054 800-233-8472/712-943-2000

All systems have a 30 day Money Back Guaranted and 1 Year Warranty.

Due to the Volatility in the DRAM Market all prices subject to change.



PC to PAPER

FAX GROWS UP

Less than a year ago,

a fax board for a PC was a questionable investment. Today

you can find at least several

well-designed systems that transmit text and graphics—

and handle the arcane

details of data communications for you.

n case you haven't noticed, fax technology is coming of age—and changing the way businesses communicate.

The latest wrinkle in fax transmission is the partnership between fax and PC. Like any good partnership, this is one where

the partnership between fax and PC. Like any good partnership, this is one where both sides bring something important to the relationship. Fax technology offers a worldwide communication standard and a large installed base of fax machines with which to communicate. The PC makes it easy to manage a large phone book and multiple distribution lists. It also lets you schedule calls at inexpensive, nighttime phone rates.

As a PC user, you can look to fax boards for an alternative means of data communications. A fax board gives you a way to transmit text and graphics without having to worry about such matters as baud rates, parity, stop bits, file transfer protocols, and other arcane details. As a fax user, you can look to PC-based fax packages as a way to automate fax distribution. From either point of view, joining PC and fax promises to achieve more than

either technology can offer alone.

Alas, much of the potential remains just that—potential. You can still get burned by making the wrong choice. In PC Magazine's last roundup of fax boards (see "Getting the Fax," June 28, 1988), we found that many packages seemed to have been cobbled together. The typical menu system looked as if it had been added as an afterthought, with menu choices that weren't implemented and important features available only from the DOS command line.

This time around, we found some of the same problems. But we also found several well-designed packages—among them Intel's Connection CoProcessor. The Complete PC's Complete Fax/9600, Quadram's JT-Fax 9600, and Brother's IntelliFAX—that are good examples of what a fax package can be. In short, the PC-based fax package is coming into its own.

WHICH FAX IS FAX? Facsimile transmission has been around since the middle of the 19th century. Fax standards as we know them today date back to the 1960s,

when the European-based CCITT (International Consultative Committee on Telephone and Telegraph) first established worldwide standards. Fax machines based on the Group I standard took about 6 minutes to send a single page. Group 2 protocols, established in the mid-1970s, cut transmission time in half.

Throughout the 1960s and 1970s, the number of fax machines grew slowly and steadily. However, the explosion didn't begin until the 1980s and the introduction of the Group 3 standard.

Group 3 fax is what most people mean when they talk about fax. Introduced and approved by the CCITT in the early 1980s, the Group 3 standard succeeded in making fax transmission simple, reliable, and faxt. Group 3 machines use a 9,600-bit persecond, half-duplex modem to transfer data on standard phone lines, and they include a data compression scheme to speed transfer further still.

Transmission time varies depending on the compressibility of a given page, but it typically ranges from 30 to 60 seconds per page. On poor lines, the fax modern will drop back to 7,200 bps, then 4,800 bps, and then 2,400 bps. This slows down the transfer but still lets the fax get through. Some Group 3 machines can also detect a Group 2 or Group 1 machines and fall back to the earlier protocols. (Few fax boards include this feature. However, this is not an important factor for most users, since there are few Group 1 and 2 fax machines in use.)

Just as important as speed, Group 3 offered improved readability. A machine in either Group 1 or 2 had a resolution of about 100 dots per inch. Group 3 fax resolution is either 100 by 200 dpi (standard resolution) or 200 by 200 dpi (fine resolution)

With the introduction of Group 3 machines, the fax market took off. According to Alan Pyne of CAP International, a market research firm that specializes in fax issues, sales of fax machines in the U.S. have more than doubled in each of the last 4 years—with about 90,000 sold in 1985, 200,000 in 1986, 450,000 in 1987, and as many as 1 million in 1988. During the same time, the installed base of fax machines in the U.S. has gone from 200,000 to 1.9 million, and the installed base worldwide has gone from 1.2 million to 7.7 million. Sales are expected to double once again in 1989.

This explosion in the fax market has been accompanied by falling prices. As recently as early 1987, a stripped-down fax machine sold for \$2,500 or more. In 1989 the least expensive machines sell for well under \$1,000.

The numbers speak for themselves. Clearly the fax market has reached critical mass. The value of having fax capability has increased dramatically, simply because there are more people to talk to, while the price of that capability has gone down. As a practical matter, owners of even small businesses are beginning to find it embarrassing if they have to answer no to the question "Can you fax lit on me?"

Not so incidentally, there is now a Group 4 fax standard. Group 4 fax machines can send a page in 5 to 10 seconds, with resolutions of up to 400 dots per inch. However, this group of machines requires an all-digital telephone network, which is not likely to be widely available until well into the next century, and they sport prices

of \$8,000 and up-mostly up.

For now and some time to come, Group 4 machines will be of interest primarily to a few large corporations that raw villing to make the investment in dedicated, digital lines for in-house communications. For the rest of the world, fax communications will mean Group 3 fax.

ENTER THE PC When PC-based fax packages were introduced at \$1,000 to \$1,500, stripped-down fax machines were selling for \$2,500 to \$3,500. Many argued at the time that fax boards could serve as inexpensive substitutes for fax machines. With fax packages now in the \$400 to \$1,000 range and fax machines selling for

Receiving a fax on a PC adds its own complications: reboot your system while a transmission is in progress, and you can lose the fax.

under \$1,000, that argument is hard to maintain.

In reality, fax packages never were an inexpensive substitute for a fax machine. Start with \$1,000 for a fax package, add another \$1,000 or so for a scanner, and you're well into fax machine territory. What's more, since fax files are graphics files, they can quickly eat up a great deal of disk space. Realistically, you'll need 2 or 3MB of storage even for casual use; so you may need to spend a few hundred dollars for a larger hard disk. By the time you're done, you could easily buy a full-featured fax machine.

Aside from price, there is the issue of convenience. One of the driving forces behind the fax revolution is ease of use. Most fax machines are almost as easy to use as a telephone; put the paper in the fax scanner,

enter the phone number, and hit the start button. Anyone can learn how to use a fax machine in about 5 minutes' time.

Compare that with faxing from your PC. First, you have to load the fax program. Then, if you start with hard copy, many packages force you to scan the image into a fax file as a separate step. Even those packages that let you scan and send in a single step will ask you to make more choices than with a fax machine.

With a typical menu system, to send a fax you might have to choose Send, designate where to send from (disk or scanner), tell the system what kind of disk file if sending from disk (for example, ASCII, PC Paintbrush, Dr. Halo, or fax format), whether to send immediately or at some specified time and date, and whether to take a phone number (or distribution list) from an on-line phone book or let you enter it from the keyboard. With all these choices to make, even the most intuitive menu structure will take some time to learn.

Receiving a fax on a PC adds its own complications. With a PC-based package that uses foreground mode, you have to load the program, wait for the fax, then typically give it a command to print the fax. For those programs that use background mode, you have to give up some precious memory and hope that the fax program doesn't conflict with any of your other programs. You may also run into such problems as losing a fax simply because you chose to reboot your system and didn't realize that there was a fax transmission in progress. Compare that to receiving on a fax machine, where all you have to do is pick up the pages as they fall out of the fax printer.

WHEN FAX MAKES SENSE Clearly, a PC-based fax package at any price is not a practical substitute for a fax machine. Yet there are two situations where fax boards make good sense. One is when your needs are so sporadic that you can probably manage without any faxing capability at all. The other, ironically, is when your needs outstrip the abilities of a fax machine.

If your faxing need is strictly occasional and is limited to receiving faxes and to sending text and graphics that you create on your computer, then a fax pack-

age-without a scanner-is all you need. Virtually all fax packages will convert and send ASCII files, and most will convert one or more popular graphics formats: typically PC Paintbrush and Dr. Halo. Some packages-such as The Complete PC's Complete Fax/9600-will even capture output meant for a printer. This procedure lets you tell your favorite program to print a file, then have the fax package convert the print output into a fax. One of the benefits of sending a graphics file by fax rather than by modem is that you can send graphics to anyone and not have to worry whether the person receiving it has the right graphics program with which to print the image.

If your needs are heavy duty, almost any fax package will let you create and manage large phone books and multiple distribution lists. Some go even further. For example, Ricoh's ImageCard is designed to be a server for a fax network. Special software lets you call from PCS that don't have fax boards and use the serverges—notably GammaLink's GammaFax—include a rich batch language to let you program your own applications.

PC-based fax packages have some inherent advantages over fax machines. Any fax sent directly from disk will look sharper than one that has been scanned, simply because scanning degrades an image. Also, any fax printed on the paper of a computer printer has an advantage over faxes printed on the thermal paper of a reasonably priced fax machine.

One common misconception is that faxes printed on a 300-dpi laser printer will automatically look better than faxes printed on a fax machine. This is not usually true. The quality of the laser output depends almost entirely on the conversion algorithm in the fax package. In any case, as our timing tests show, receiving a fax and then printing it at even 150 dpi on a laser printer takes far longer than printing on a fax machine—or a dot matrix printer. If you get a fax package, you may want to resurrect your old dot matrix printer.

SIMILARITIES AND DIFFERENCES The 15 packages reviewed here represent a wide range of design choices, yet these fax packages share a number of important fea-

FAX MODEM AS DATA COMMUNICATIONS MODEM

ne of the more intriguing facts about 9,600-bit-per-second fax boards is that every board is built around a 9,600-bps modem. Some fax packages, like Intel PCEO's Connection CoProcessor, take advantage of this by offering a 9,600-bps file-transfer feature.

Unfortunately, you can't use the highspeed file-transfer feature unless you have the same model board on both sides of the connection. What keeps different boards from sending files to each other is that each manufacturer uses its own filetransfer protocols.

Given that the 9,600-bps modem market suffers from this same lack of standardization, fax board manifacturers have a golden opportunity. Namely, fax board modems can become the basis for a 9,600-bps standard for data communications. All that's needed is agreement on the standard.

That standard may well be coming and sooner rather than later.

In August 1988, CAP International, a market research company that specializes in fax issues, called a meeting of fax vendors with the hope of hammering out a standard for binary file transfer. As a result of that meeting, a group was formed to help establish a standard. Last

November this group became an official subgroup of the Electronic Industries Association (EIA) TR29 Fascimile Systems and Equipment committee with the function of defining the data processing protocol for fax boards.

As of this writing, the subgroup on binary file transfer had been charged with presenting a proposed standard to the TR29 group in February 1989. According to Phillip Bogosian, the chairman of the subgroup, the proposal emerging from the February meeting should be developed well enough that some manufacturers may choose to implement it even before it becomes an official EIA position. If so, we will soon be seeing fax boards that include the proposed binaryfile-transfer specification.

According to Bogosian, current boards should be able to use the natural action it is developed. For boards without processors, the protect should be fully implemented in the software. Boards with processors will probably need firmware changes. But in any case, the new standard should not require additional hardware—though some manufacturers may chose to add more memory, for example, to gain additional buffering.—M. David Stone

tures, particularly on the hardware side. All 15 are built around the same Rockwell chip set, ensuring an underlying compatibility with fax modern protocols. Several—including Intel's Connection CoProcessor, The Complete PC's Complete Fax/9600, and Ricoh's ImageCard—feature on-board microprocessors to allow true background operation.

Most, including the Connection Co-Processor and the Complete Fax/9600, offer a Hayes-compatible 1,200- or 2,400bps modem either as standard equipment or as an option. And only one board, Omnium Cop.'s Omnium PC Fax System, has a maxium transmission rate of 4,800 bbs. all the rest have a maximum transmission speed of 9,600 bps.

As is often the case, software varies more widely than hardware. For example, some packages force you to convert files to fax format in a separate step: others convert and send in a single step, creating the fax file automatically. Still others—notably Quadram's JT-Fax 9600 and Intel's Connection CoProcessor—minimize the need for disk space by converting to fax format during transmission without needing to create a new file.

Encouragingly, installation was not as much of a problem with this crop of packages as in the past. In many cases, reviewers had products installed and working in an hour or less, thanks to generally im-

■ FAX SYSTEMS

proved installation instructions. Alas, there are still some packages that can take a full day or more to get up and running.

INTRODUCING CAS A last item worth noting is the introduction of CAS as a feature on Intel's Connection CoProcessor. CAS, the DCA/Intel Communicating Applications Specification, is a proposed standard for communications hardware and software. Given CAS hardware such as the Connection CoProcessor, any application can use CAS to add background communications and fax capabilities.

CAS allows for wide variation among programs. Typically, the communications menu for each application will be designed to look like the base program, so that a Lona 1-2-3 add-in will have the look and feel of 1-2-3, while a WordPerfect menu will have the look and feel of WordPerfect. Unfortunately, the variation can extend to features and menu logic (as opposed to look and feel) as well, so that if CAS catches on, you may have to learn a different menu logic with each program, and you may have limited features available in some programs.

As of this writing, the impact of CAS is not clear. The idea of a standard back-ground communications capability is attractive, but many fax packages without CAS already handle fax transmission from within any application. And even as CAS applications are being developed, so are other, competing approaches. For example, WordPerfect has just announced a new driver to let users send and receive faxes from within WordPerfect 5.0 using IT-Fax.

By all indications, we are looking at the opening moves in a drive to integrate fax capabilities into standard PC applications. The results promise to be interesting.

AMERICAN DATA TECHNOLOGY INC. SMARTFAXDIUS

American Data Technology's SMART-FAXplus is the fax board for the person who needs everything. Besides having the standard fax capabilities, the software that comes with the SMARTFAXplus offers you several convenient reference re-



Besides such advanced fax features as calling lists, transaction logs, and a printer capture mode, the software that accompanies the 9,600-bps SMARTFAXplus, a \$799 full-length interface card from American Data Technology, has reference resources for time zones and telephone area codes.

sources, such as those for time zones and telephone area codes. It also boasts a full array of advanced features such as calling lists, transaction logs, and printer capture mode. The basic unit costs 5799, but if you want to buy add-on modules to equip the SMARTFAXplus with a data encryption board, a scanner interface card, a modem, and more, you can spend in the neighborhood of \$2,000—overkill for most applications.

The basic unit is a 9,600 bits-per-second fax board on a full-length interface card. Its accompanying software employs a combination of simple-to-use horizontal moving-bar menus for major functions and pull-down vertical menus for options.

RELIABLE BUT NOT PERFECT The SMARTFAXplus runs in the foreground. in the background, or as a TSR that takes up about 60K of memory, an improvement over some other programs that need a minimum of 140K just to sit in the background and stay awake. Our background operation error testing proved the SMARTFAXplus to be reliable but not great: you won't get into trouble by losing faxes it thought it sent, since it can recover from problems and reschedule calls. On the other hand, if a receiving computer is busy looking at an empty drive, the SMARTFAXplus can't sneak through as can some of the more robust units.

The SMARTFAXplus has calling lists,

call scheduling, a printer capture mode in which it holds anything formatted for an Epson FX-80 printer, and screen capture for subsequent transmission. Unlike some other units, the SMARTFA/Dlus does not capture screens for immediate transmission, though it can send capture screen files later. Quite handy is a conversion utility for changing files between text, graphics, and fax formats before or after transmission. You can also convert files to fax format at the same time as transmission to save disk space.



SMARTFAXplus

FACT FILE

American Data Technology Inc.
44 W. Bellevor Dr., #6
Pasadena, CA, 91105
(818) 578-1339
List Prices S799
List Prices S799
List Prices S790
To S790
To S790
List Prices S790
List

In Stori: A mocerately expensive yout-ops internal fax board system that can quickly become a very expensive system with the addition of optional modules. The SMARTFAXplus software uses horizontal sliding-bar and pull-down menus and is easy to operate. Includes a world map with time zones and an area code database.

CIRCLE 306 ON READER SERVICE CARD



Connect up to 16 computers and printers without network nightmares.

Power file transfer

Imagine transferring files at 500,000 bps, without a network! Just plug a 3X-LINK16 cable into the perallel port on up to 16 computers, up to 400 feet cable length (your printer stays connected). Then run our software.

In just seconds, you'll be transferring files in full background model No need to interrupt your current program. And no need to interrupt your business as you install (and maintain) an expensive network. You can even transfer files automatically, using our autoscript feature.

3X-LINK16

3X-LINK16 Through parallel port

TO HETWORK

3X-LINK16 KSTATION AND

Instant printer sharing

And our optional 3X-Spool16 intelligent printer spooling software lets you share connected printers (up to 16), automatically managing paper sizes all without waiting. And without buying limited, expensive printer sharing boxes.

Invisible E-Mail

What's more, our built-in E-Mail feature lets you send messages in background mode, no extra E-Mail software required.

The choice is yours:

3X-LINK16 comes complete with 3 1/2" and 5 1/4" software diskettes, parallel connectors, and a 12 foot cable... all you need to connect two PCs for only \$199. Additional stations can be added for \$139 each. 3X spool16, our printer sharing software option, can be added for only \$149.

And you get our 30-day money back guarantee to insure your satisfaction.

The only thing easier than choosing 3X-LINK16* is using it.

For more information or to order 3X-LINK16®, contact your local dealer or call:

> 800-327-9712, or FAX: (201) 592-0908, or in N.J.: (201) 592-6874

or in N.J.: (201) 592-6874

TO PRINTER



3X-LINK16

3X USA Corp. One Executive Drive Fort Lee N.J. 07024 Phone: (800) 327-9712

Give us an inch...



...and we'll give you complete power control. MasterPiece, Plus

Master Piece Plus gives you everything you need to organize and protect your personal computer system. It offers five outlets, a master switch, surge suppression, noise filtering, static protection, a low voltage indicator, modem protection, and a swivel—all in one elegant unit just an inch and a half high.

Master Piece Plus blends in perfectly with any system. Just slide it between your monitor and system unit, and plug your equipment into its five outlets for complete control. Its master switch lets you power up everything at once, and its individual switches let you control your peripherals separately. Touch the master switch to shut down and you'll never accidentally leave anything running overnight.

Master Piece Plus also offers the most complete protection available. Its heavy duty surge suppression







circuitry exceeds strict UL and IEEE specifications. Its noise filtering circuitry protects against EMI and RFI. Its two protected phone jacks defend your modem (and PC) against surges and spikes on the phone line. Its nameplate dissipates harmful static whenever you touch it. And its unique low voltage indicator alerts you when your power level drops below the safety of 104 Volts, to warn you of dangerous low power conditions.

Master Piece Plus even has a hidden swivel that lets you adjust the angle of your monitor. (Easily detachable if your monitor already has a built-in swivel.)

Master Piece Plus — the only complete power center — only \$159.95. Call 800-535-4242 or 212-475-5200 for a Kensington dealer near you. Or write to Kensington, 251 Park Avenue South. New York. NY 10010.



■ FAX SYSTEMS

SMARTFAXplus reads and writes PC-Paintbrush, Dr. Halo, and TIFF graphics files. Once you receive a file, SMART-FAXplus has only limited editing features, including cutting and pasting, file merging, and the ability to add text to a file. It also has normal- and high-resolution modes, normal and compressed fonts, and gray scaling support, which cannot be turned off

According to the vendor, the SMART-FAXplus works with all Group 3 fax machines; we had no trouble sending or receiving faxes with any of the fax machines used in testing. In addition, the system

While the
SMARTFAXplus is a
fancy unit that's
easy to like, it
didn't fare too well
on the PC Labs aspect
ratio tests.

works with Princeton LS-300A, Hewlett-Packard ScanJet, Canon IX-12, and Pentax scanners, and with IBM and Epson dot matrix and HP LaserJet printers and their compatibles as well as the Canon laser printer.

In our tests the SMARTFAXplus was moderately fast. As is typical, it took about twice as long to receive and print a file with the SMARTFAXplus as it does to get hard copy from a fax machine.

The SMARTFAXplus didn't fare too well on the PC Labs aspect ratio tests. While you can easily adjust page size both vertically and horizontally to correct for skewed aspect ratios, when we used the default settings the resulting test grid came out about twice as long as the original, and text came through looking as if it had been squashed. These problems can be taken care of by adjusting the page size, but the fact remains that the SMARTFAXplus

was noticeably off on this particular test.

Despite this, it's easy to like the SMARTFAXplus; it's a fancy unit with a lot of features and an attractive interface. You just have to make sure that you can resist the temptation to load up on all but the most essential extras.—Bruce Brown

AT&T AT&T Fax Connection

AT&T's fax board has the sleek, luxurious look that goes with fine materials and careful workmanship. But the software that comes with the full-length \$995 Fax Connection board, while straightforward and reliable, is a lot less sleek-looking, It works entirely from the DOS command line, using almost no menus except during installation.

The Fax Connection's software drives a scanner, maintains a useful and readable log, lets you view incoming faxes reasonably quickly, and lets you send multiple files to one or more destinations. The software runs in foreground mode only, forcing you to convert your computer temporarily into a fax machine whenever you send or receive. Many users will need little

However, a couple of paragraphs buried in an addendum to the manual suggest that you may want to buy AT&T's separate PagePower software package to in-

crease the powers of the Fax Connection board. PagePower is a \$295 software behemoth that you can buy along with the board for \$200 if you know enough to order them together. PC Labs tested the board with the software that comes with it, and we also took a long look at Page-Power.

The native software installs in a few seconds. You can choose to work with an Epson, H.P. or AT&T printer, and you can choose the size of the buffer used for incoming faxes (the larger the better). You also select the resolution you want for sending and receiving and pick a horkey for a screen capture program. Anyone familiar with DOS command line syntax can start running the program after spending a few more seconds with the manual.

SENDING AND RECEIVING When you run the sending program, you use the DOS command line to specify the names of the files you want to send, the resolution, the phone number (or file with a list of numbers), or an optional switch that lets you start sending manually during a voice call. The software automatically sends ASCII files without preconversion, but can't convert or send any graphics formats other than those created by a scanner. However, you can merge the first page of text with a graphic logo or letterhead file created with the scanner.



The full-length 9,600-bps \$995 Fax Connection board from AT&T comes with software that drives a scenner, maintains a useful and readable log, lets you view incoming faxes reasonably quickly, and lets you send multiple files to one or more destinations. The software runs in foreground mode only, forcing you to convert your computer temporarily into a fax machine whenever you send or receive.

■ FAX SYSTEMS



Fax Systems: Summary of Features (Products listed in ascending price order)

FAX FEATURES	Microlink Fax LC96 \$499	FaxMall 96 \$599	Omnium PC Fax System \$599	Pamirs FA10 \$645	GammaFax \$695	MicroFax \$695
Standard Group 3 speeds (bps)	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	4,800, 2,400, 1,200	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400
High-resolution mode	0	•	•	•	•	•
Supports gray scale or dithering	o	•	•	•	0	•
Transmits compressed fonts	0	•	0	•	•	•
Cen include document header	•		0		0	
Maximum number of pages transmitted	999	360	Unlimited	Unlimited	Unlimited	Unlimited
Does polling	0	•	0	•	•	•
Runs in background mode	•	•	O	Ō	•	•
TRANSMISSION FEATURES						
Transmits directly from scanner	•	•	0	•	•	•
Sends current screen in response to PrtSc	0	0	0	0	0	•
Saves current screen to file	0	0	0	0	0	•
Directs printer text output to fax	0	•	0	0	0	0
Directs printer graphics output to fax	0	•	0	O	0	Ō
Saves printer text output to file	0	•	0	0	0	0
Saves printer graphics output to file	0	•	0	0	0	0
Converts to	Dr. Halo, GEM Paint, Microsoft Paint, .PCX, TIFF	ASCII, .PCX	ASCII, Dr. Halo, .PCX	.PCX	ASCII, .CUT, .PCX, TIFF	GEM, .IMG, PC Paint, .PCX, TIFF
Converts from	Dr. Halo, GEM Paint, Microsoft Paint, .PCX	ASCII, .PCX	ASCII, Dr. Halo, .PCX	ASCII, Dr. Halo, .PCX, Windows Paint	ASCII, .CUT, .PCX, TIFF	GEM, .IMG, PC Paint, .PCX, TIFF
Does automatic erasing after transmission	•	•	0	•	0	0
OTHER						
Compatible scanners	~					
Canon Image Scanner	● (IX-12)	● (IX-12)	0	● (IX-8, IX-12)	● (IX-12)	● (IX-12)
DEST	0	0	0	0	0	0
Hewlett-Packard ScanJet	•	•	0	0	•	
Microtek	ō	ō	ŏ	● (MS-200C, MS-300C)	o	● (MS-300A)
Panasonic	0	0	0	0	0	● (FX-RS505)
Princeton Graphic Systems	0	0	0	0	0	● (LS-300A)
Other	Mitsumi DFI hand scanner	Brook Trout IX-12	-	Digitech hand scanner	None	AT&T Overview, Datacopy, IBM 311: Ricoh, ShapeScan SS-240
Generates letterhead	0	•	0	•	•	0
Generates custom fonts	0	•	0	0	•	0
Includes standard modem	0	0	0	0	0	•

	The Complete Fax/9600 \$699	JT-Fax 9600 \$795	SMARTFAXplus \$799	AT&T Fax Connection \$995	Connection CoProcessor \$995	Facsimile Pac \$995	Brother IntellIFAX \$999	Panasonic FX-BM89 + Fax Partner \$999	ImageCard \$1,175
_	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	9.600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400
	•	•	•	•	•	0	•	•	•
	•	•	•	•	•	•	•	•	0
	•	•	•	(landscape only)	•	0	•	•	•
	•	•	•	•	•	0	•	•	•
	999	Unlimited	Unlimited	Unlimited	Unlimited	999	Unlimited	Unlimited	999
	•	0	0	0	•	0	0	•	•
	•	•	•	0	•	•	•	•	•
	•	•	•	0	0	•	•	•	0
	•	•	0		0	0	•		0
								0	
	:	0		0	0		0	0	0
		•		0	0		•	0	0
	•	0	•	0	0	•	0	0	0
	.CUT, .MSP, .PCX, TIFF	.PCX	Dr. Halo, .PCX, TIFF	ASCII	.PCX, .PIC	ASCII, Dr. Halo, .PCX	.PCX	ASCII, .PCX	.CUT, .PCX
	.CUT, .MSP, .PCX	.PCX	Dr. Halo, .PCX, TIFF	ASCII	.PCX, .PIC	ASCII, Dr. Halo, .PCX	.PCX	ASCII, .PCX	.CUT, .PCX
	0	0	0	0	N/A		0	0	0
	● (IX-12)	● (IX-12)	● (IX-12)	0	● (IX-12)	0	● (IX-12)	● (IX-12)	0
	• (All)	0	0	0	0	(PC Scan 1000 and 2000 series)	0	0	0
	•	•	•	0	0 (140 0004)	0	•	0 (140 2004)	0
	• (All)	0	0	0	● (MS-300A)	0	0	• (MS-300A)	0
	0	0	0	0	● (FX-RS505)	0	0	● (FX-RS505, FX-RS506)	0
	0	• (All)	• (LS-300A)	0	0	0	• (LS-300A)	0	0
	None	Chinon	Pentax SB-A4301, ShapeScan	AT&T SC-60	Datacopy 220, 230	None	Brother Intelli- SCAN; Chinon N205 and Desk- Scan 2000	None	None
	0	•	•	•	0	0	•	0	0
	•	0	0	0	0	0	0	0	•
	0	0	0	0	0	0	•	0	0



"Remote access to my PCs

"Ashton-Tate, Borland, IBM, Lotus, Microrim. Novell and 3Com all use Close-Up for their remote support. And now I know why. What a powerful management tool!"

It's true. Every major hardware and software manufacturer that offers remote services and support uses Close-Up.* Here's why. Close-Up. gives you versatility, ease of use and reliability. It lets you work in tandem with your associates, share their screen and keyboard, access their DOS and run programs on their computer, all remotely. Business solutions. Just imagine the possibilities.

Customer Support

Take IBM for example, Our agreement covers over 100,000 copies of Close-Up for their support centers. Now IBM personnel can use their PCs to dial a customer's PC and be connected to their mini or mainframe. Linking





screens and keyboards as one unit. IBM and their customers can now diagnose problems together. Simultaneously.

Remote Order Entry

Novell uses Close-Up for its entire North American order/entry system. Their regional offices can call into any one of the 45 central office workstations running Close-Up and become part of Novell's order entry network. With file server access at full network speeds, 24 hours a day. And, using our print feature, reports are printed remotely at the regional sites.

Franchise Training & Support

Companies like Computerland, Kwik Kopy and PIP are opening new stores all the time. With Close-Up, they are able to train new employees. set up operating procedures, and monitor results instantly from their corporate offices. In fact. Computerland supports its large dealer network by using Close-Up with its Store Management System.

Point of Sale

Softsel uses Close-Up exclusively for their new Dial-Up SalesNet order/entry inventory system. They like Close-Up's error-corrected keystrokes and screens, ensuring that orders are entered accurately. Dealers can call in from around the country to check current inventory levels and review product/price descriptions. With ease,

CIRCLE 224 ON READER SERVICE CARD

Close-Up works at night ... so you don't have to.

Close-Up automates routine jobs day or night. Imagine an automated inventory and sales data system that calls all your offices, say 25 of them, each night (when phone costs are down). Back at your home office, Close-Up will run the inventory spreadsheet with a macro to consolidate the information. Close-Up then sends back the accumulated data. Even printing it out at each location for morning meetings. All this, while you sleep.

Join the Leaders

Close-Up is the clear choice of Fortune 500 companies and for compelling reasons. Why? Close-Up is quite simply more versatile, easier to use, and more reliable than any remote software on the market. Call us for an even closer look

- ► Remote Support ► Remote Order Entry ► Home to Office Communications ► PC to PC
- Communications ► PC to Mini or Mainframe ► PC to Information, Telex, & Electronic Mail
- Services ► Automated Communications
- ► Gateway to LANs

Call: 805/964-6767

Norton-Lambert

PO Box 4085, Santa Barbara, CA 93140 USA Telex 709170 Copyright Norton-Lambert Corp. 1988 IBM/PC/XT/AT.

PS/2 and Compatibles



FACT FILE

AT&T Fax Connection

AT&T Fax C

I Speedwell Ave. Morristown, NJ 07920

(800) 247-1212 **List Price:** \$995; *PagePower* software, \$295 (\$200 if bundled with board).

Requires: 512K RAM; hard disk; CGA, EGA, VGA, or Hercules monochrome graphics adapter (color with *PagePower* software); DOS 2.1 or later (DOS 3.0 or later required with *PagePower* software).

In Short: Excellent hardware that can't decide what kind of software it wants. The software supplied handles basic functions from the DOS command line; the optional Page-Power software offers advanced functions in a more convoluted style.

CIRCLE 397 ON READER SERVICE CARD

A separate landscape-mode sending program sends ASCII files in pages of 132 columns by 66 lines. Another program drives the AT&T SC-60 scanner and creates files in fax format that you then send with the sending program. And a screen grabber is available to capture a text or graphics screen and convert it into a fax format. You have the option of converting a white-on-black screen into a more readable black-on-white.

Receiving is just as straightforward. You can set the board to wait for a transmission or to receive on command. A simple viewer gives you no control over scale and probably won't show you enough of the page to make the program worthwhile, but at least you can flip the image if it came in upside down. You'll use the print program instead of the viewer in most cases. The software sends and prints at generally impressive speeds.

IGNORE AND PAY EXTRA? AT&T says that it limits the software packed with the board to these simple functions so that VARs can devise their own software packages for customers. AT&T suggests that

themselves, AT&T seems to be charging extra for capabilities that other vendors supply with the board.

PagePower has capabilities to spare. AT&T wrote his impressive integrated set of fax, scan, draw, and communications programs to run under Microsoft Windows (a runtime version is supplied with the program), and Windows's graphics interface is ideal when viewing or editing a fax file. And the mouse speeds things up when you select files from a menu. Windows, however, is less than ideal when you perform character-based functions like editing a phone list or typing in a time for a transmission.

The fax software in PagePower works with a resident scheduler, so you don't have to stay in Windows to send or receive. It can use the TIFF format to exchange files with its built-in draw program, and you can use the Windows clipboard to exchange graphics from other formats. Strangely, the draw program locked up the computer when I used it with a copy of Windows installed for a Hercules board, although it worked perfectly with VGA and EGA cards.

POWERFUL BUT REGRESSIVE

Powerful as it is, PagePower takes a step backward from the software included with the Fax Connection board in some respects. You have to preconvert ASCII files into fax format before sending them—a step that the board's less sophisticated software makes unnecessary. Furthermore, all functions now require you to tumble down a cascade of menus before you can complete them, rather than working from the DOS command line. The only way you can send faxes without using PagePower is by using a command-line program that drives a scanner but won't work with disk feites as scanner but won't work with disk

We tried to load both PagePower and the software supplied with the board on the same machine, but the two did not coexist. The ideal software for AT&T's superb hardware might be neither the current ver-

BROOK TROUT TECHNOLOGY INC. FaxMail 96

What makes Brook Trout's \$599 FaxMail 96 such a good catch? Well, Brook Trout offers two user interfaces: an attractive menu-driven system for those who need the hand-holding, and a sophisticated command-driven interface for those interested in automating fax transmission. It also incorporates a proprietary print capture utility that lets you redirect any LPT1 output from any application to a Group 3 fax format file. Essentially, this means that if you can print it, you can send it.

That's not all. Brook Trout offers the supporting tools every fax board should include. There's a built-in min-word processor, powerful enough to send text messages without having to darken the directories of your word processor. There's a graphics editor that handles simple cut, paste, and view functions. And finally, Brook Trout has a useful facility for adding existing signature and letterhead files to the bod of your text.

EFFORTLESS INSTALLATION The Brook Trout system includes a full-length board, three disks of software, and a phone cable. Software and hardware installation is effortless. The board comes configured with a certain port address and interrupt settings, but these can be changed easily

through DIP switch and jumper settings.



FaxMail 9

Brook Trout Technology Inc. 110 Cedar St. Wellesley Hills, MA 02181

(617) 235-3026 List Price: \$599

Requires: 256K RAM (hard disk recommended for storing images); CGA, EGA, or Hercules graphics adapters; DOS 2.0 or

In Short: A fax package that includes all the



"We need Accounting Software we'll <u>never</u> outgrow."



"You need Macola. Here's why."

Choosing the <u>right</u> accounting software can be a complicated process. And due to the time and money invested, this decision should be made only once—regardless of how much your business grows.

There are plenty of reasons why you'll never outgrow Macola Accounting Software. Here's just five.



Reason 1: Flexible and Powerful. In the words of PC Magazine, Macola Accounting Software "is at the top

of its class...a flexible, powerful system that is well suited to many different businesses."

Reason 2: Fourteen Integrated Packages. It's modular, so you can add more computing power as your needs grow, from simple accounting to full scale accountability.

Accounting General Ledger— Accounts Receivable—Accounts Payable—Payroll—Assets/Depreciation

Distribution Inventory Management—Customer Order Processing —Purchase Order and Receiving Manufacturing Bill of Material Processor—Material Requirements Planning—Master Scheduling— Shop Floor Control—Job Costing —Standard Product Routing

That's not all. There's a Report Writer that allows customized reporting and can easily transport data files to popular spread sheet, word processing and database programs.



Reason 3: The best multi-user LAN compatibility. No

Reason 4: Unparalleled Speed and Data Integrity. Macola Software is the only high-end accounting software written in Micro Focus COBOL... for maximum speed and data integrity. Source code is available. IBM has licensed Micro Focus COBOL as its SAA standard for the new PS/2 and OS/2.

Reason 5: Comprehensive Support. Toll-free 800-line support is available from Macola. Or, utilize Macola's nationwide network of authorized resellers for local training, customization and hands-on support.

These are just five reasons why you'll never outgrow Macola Accounting Software. For more reasons, more detailed information, "live" demonstration packages and an authorized reseller in your area, call today:

1-800-468-0834 (USA) 1-800-336-8337 (CANADA) CIRCLE 263 ON READER SERVICE CARD



333 E. Center St. PO. Box 485 Marion, Ohio 43301-0485 614/382-5999

Accounting Software You'll Never Outgrow.



The \$599 Brook Trout FaxMail 96 system includes a full-length 9,600-bps board, three disks of software, and a phone cable. The board comes configured with a certain port address and interrupt settings, but these can be changed easily through DIP switch and jumper settings.

You can transparently access the software's executable programs via the menu system, or you can run each, with a series of arguments, from the DOS command

Brook Trout relies on a RAM-resident scheduler module to send and receive faxes. If the resident portion, RESXMIT .EXE, is not loaded, you can still print a fax message or view the activity log, but you cannot send or receive messages. Running in the background, the 40K resident scheduler remains in memory; when running in the foreground, it is invoked and then disabled

ASCII, PC Paintbrush, and print capture files can either be converted before transmission or be converted and sent in one fell swoop. When we scanned PC Paintbrush files for transmission, all was fine. However, when we used existing PC Paintbrush files for transmission in fine resolution, they were elongated to twice their size. You can remedy any aspect ratio problem by using Brook Trout's graphic editor software, issuing a command-line argument to adjust the on-screen or printed size. And according to Brook Trout's technical support staff, using the vendor's print capture utility will also yield more consistent results

MENUS EASE THE WAY Detailed menu selections make routine fax transmissions a pleasure. Main menu selections are augmented with pop-up menu boxes. Using the send menu, for example, you can specify a delayed transmission or use a phone file to insert a frequently dialed number. You can attach a previously created letterhead or signature through the menu selections. You can receive a fax automatically in the background, where every file is logged in as FAX00*.301, or you can choose to receive manually and enter a filename of choice

The only confusing aspect of using the menus is their extensive use of Journals. Within the submenus you can access three different Journal commands: each offers a different type of activity summary.

Leaving the menus is a different story. since the documentation is particularly sparse when it comes to explaining the command line arguments. For example, the software's ability to do dithering was undocumented, the printer scaling argument was wrongly documented, and the creation of a distribution list was poorly documented

MONITORING TRANSMISSIONS

Feedback is sent to the user during transmission, and reception is top caliber. A pop-up status box lets you monitor the messaging process, informing you when your machine is dialing or waiting for an answer, when a ring is detected, and when handshaking is going on. You can also view the transmission packet by packet and can watch as your reception is verified

The full-screen text editor, Write, while by no means a full-featured word processor, is a useful feature. It uses a WordStar-like command system, handles 128K files and even includes split-screen editing. It also serves as a tool to create ASCII files for maintaining distribution

The spartan command-driven graphics editor, misnamed Supershow (it should be called Minishow), lets you view, scale, cut, paste, and flip a graphics image. Although this graphics editor won't let you modify or manipulate an image to the extent that PC Paintbrush will, it has most of the features that most users will need most of the time.

The Brook Trout FaxMail 96 is a complete package supported by a top-notch technical staff. That became apparent during testing, when we began to question the Group 3 compatibility of our remote fax machine, a Canon Faxphone 20. Brook Trout ran a debug on a transmission it sent to the Faxphone and helped us pinpoint the incompatibility. The vendor can also handle customer requests for some unusual fonts (such as Icelandic and Hebrew) and will even create letterhead and signature files for those customers without scanners. This review caught the company between documentation upgrades, so we worked with an unfinished document. But even so, it's safe to say that Brook Trout is a good catch.-Robin Raskin

BROTHER INTERNATIONAL CORP.

Brother IntelliFAX

The \$999 Brother IntelliFAX board is largely the same as the \$795 Quadram JT-Fax 9600. That's because Brother International Corp. and Ouadram's Asher Fax Products Division cooperate in the development of fax hardware and software. So how can you tell them apart-other than by price? Well, for one thing, although there is no difference in their fax-oriented features and functions, the IntelliFAX and the JT-Fax 9600 are distinguishable by their differing firmware and menu structures. Beyond that, the 2/3-length 9,600bps IntelliFAX comes with one standard combination that the JT-Fax 9600 doesn't: a 1,200-bps Haves-compatible modem and Mirror II. a Crosstalk-like communications package.



Famous CORE Reliability. CORE file servers, workstations, subsystems and peripherals give you the reliability needed to protect your network investment.

Powerful File Servers. The ATomizer 386/20 and 386/25 floor-standing file servers provide mini-computer performance with five full-height or ten half-height drive slots and up to 2.8 gigabytes of capacity.

The ATomizer 386/20 desktop file server (not shown) provides up to 1.4 gigabytes of capacity. All offer uncompromised growth capability.

High-Performance Workstations.
Complete your network configuration with ATomizer 286/12 full-size and small footprint workstations. Both increase user productivity with fast system performance and high-speed network throughput.

High-Capacity Peripherals. CORE 90 to 700MB, 9 to 16ms disk drives, high-speed 10 or 15MHz controllers and external LAN subsystems let you upgrade a system to a file server without sacrificing performance. Protect your valuable data with COREtape backup units.

Compatible with such operating systems as Novell, Star LAN and 3Com, as well as industry-standard cabling, cards and other network components.

Contact your nearest dealer or CORE representative today.

Northeast Region: 203/357-1339 Southern Region: 407/997-6055

Central Region: 312/439-0511 Western Region: 213/312-8130

213/3

International Sales:

407/997-6044 FAX: 407/997-6009

Distribution through GBC Distributors, Gates, Graydon Sherman, Ingram, MICRO D-TPD and Vitronix. In Canada, contact Markham International.

> Products listed are registered trade marks of their respected manufacturers. CORE, Aformizer and COREtape are registered trademarks of CORE International, Inc.





The \$999 Brother IntelliFAX board is largely the same as the \$795 Quadrum [I-Fax 8600, but the two are distinguishable by their differing firmware and ment structures. Beyond that, the ½-length 9,600-bps IntelliFAX come with one standard combination that the JI-Fax 9600 doesn!: a 1,200-bps Hayes-compatible modem and Mirror II, a Crosstalk-like communications package.



FACT FILE

Brother IntelliFAX
Brother International Corp.
8 Corporate PI.
Piscataway, NJ (08855
(201) 981-0300
Lett Price: 599
Requirers 640K RAM; DOS 2.1 or later.
In Short: Functionally similar to (and 5200
more than Quadram 5.17-Fax 9500 in terms
in Short: Functionally similar to (and 5200
more than Quadram 5.17-Fax 9500 in terms
of fax functionally, yell intelliFAX systems
of tax functionally, yell intelliFAX systems
dem with communications ordware and also
use a slightly better menus sucteure. It's
worth the extra money only if you need an
one and can settle for a 1,200-bp suit of
one and can settle for a 1,200-bp suit on-

CIRCLE 309 ON READER SERVICE CARE

Of course, you can spend an additional \$200 on an optional modern for the TT-Fax \$9600, but currently you won't get any software to go with it. If you already have a modern, there's no need to spend the extra \$200 in either case. And even if you do need a modern, you may not want to settle for a 1,200-bps model. Still, if you plan to use a modern only occasionally and don't have a pressing need for higher speed, the one that comes with the IntelliFAX will do the job—and won't take up an extra slot in your PC.

WORK-ALIKES There's no significant difference between the IntelliFAX's and JT-Fax 9600's performance: hard-copy output and transmission times weren't much different. For example, sending our ASCII test file directly from one PC to another took 84 seconds on the IntelliFAX and 80 seconds on the JT. Both units printed the precipited fax in 92 seconds.

The IntelliFAX also shares the JT.Fax 9600's foreground, background, and TSR operations. Both programs can stay out of the way when sending or receiving faxes in the background, slowing down operations in other software but not bringing everything to a halt, as did the original JT.Fax. While you can force the program to preconvert files to fax format before transmission, usually conversion takes place at the time of transmission, savine disk space.

The boards dealt identically with our error-handling tests, preventing us from sending a fax to a computer that was unsuccessfully trying to log on to an empty disk drive or that was paused with a Ctrl-S keystroke combination, and allowing us to send a fax to a computer while it was printing. Both the IntelliFAX and the JT-Fax 9600 also reacted well when we rebooted the computer while it was receiving a fax; in each case the call was automatically rescheduled by the sender.

The IntelliFAX has the same impres-

sive list of features as the JT-Fax 9600, such as transaction logs, calling groups, printer capture, streen capture, the ability to incorporate header and signature files, normal and fine resolution, normal and compressed type, and gray scaling.

BETTER MENU STRUCTURE While there's no fax operation that you can do with the Brother IntelliFAX that you can't do with the Quadram JT-Fax 9600, the IntelliFAX's menu structure is slightly better. Making this distinction is a bit like splitting hairs, since the JT-Fax's menus are well organized and self-explanatory. The difference between the two implementations is that the IntelliFAX uses a horizontal-moving-bar menu for major functions with pull-down menus for options, while the JT's menus start with a vertical menu and then use overlapping vertical pop-ups. Both work well, but the vertical pop-ups. Both work well, but the

Overall, the IntelliFAX is a fine unit with a great array of features.

IntelliFAX has the edge on clarity.

The IntelliFAX supports the same printers as the JT-Fax, which means most dot matrix printers (notably those that are IBM or Epson compatible) and the HP and Brother laser printers and compatibles. Supported scanners include units by Brother, Canon, Chinon, Princeton Graphics Systems, and Hewlett-Packard. The IntelliFAX also works with virtually all Group 3 fax machines.

Overall, the Brother IntelliFAX is a fine unit. It's easy to install and use, performs very well, and has a great array of features and functions. If you don't need a modem, you might want to look at the TT-Fax 9600 instead, since you'll get the same functions for \$200 less. But if you do need a 1,200-bps modem and don't want to give up a slot, this is the board to consider.—

Bruce Brown



See us at BOOTH 2808

MDEX/Spring '89 April 10–13, 1989
For display of exciting Line of MCA-Compatibles and small-footprint PC's

16 MHz VGA Powerstation

Mitac's innovative small-footprint Paragon 286VE gives you the convenience and compatibility of the "AT" standard and the best features of the emerging PS/2 technology. That means you don't have to worry about obsolescence in this period of changing standards. Best of all, the Paragon 286VE is available now!

Your bridge between the AT and PS/2 platforms, Mitac's 16 MHz Paragon 286VE is a powerful computer for general business applications like spreadsheets and desktop publishing. Brilliant built-in VGA graphics give you eye

Specifications		
RAM	1-8 MB	
Graphics	VGA+	
PiO	1	
SIO	2	
Exp. slots	6	
Hard disk	0/40/100 MB	



and planning applications. And 3-1/2" and 5-1/4" floppy disk drives mean you will never have to add an external drive

ind industrial industr

The Mitac's Paragon 286VE saves you money by accepting your existing library of AT and XT cards, peripherals and software. And if offers flawless performance under MS-DOS, OS/2 and SCO-XENIX/286 operating systems. Of course, the Paragon 286VE is backed by a full one-year warranty, TRW service and Mitac's technical support hotline. To take a look at one of the most advanced personal

computers available today, ask your local dealer about the Mitac Paragon 286VE or call Mitac for further information at

800-MITAC-US



Mittee's Paragon series of small-footprint computers includes XT-, AT- and 386-computible microcomputers. The Paragon computers are distributed in the United States by MicroAmerica, Schweber Electronics, Gates/FA, and authorized Mitac dealers and VARs. Canadian distribution is handled by TLS

65M, XT, AT, PS/2 and VGA are trademarks of in MS/DOS, DS/2 and XENIX are trademarks of Microsoft Corp. SCO is a trademark of the Santa Cruz Operation

THE COMPLETE PC The Complete Fax/9600

The Complete Fax/9600, or CFAX, is a prime example of what a PC-based fax package ought to be but too often isn't: almost as simple to use as a fax machine, but filled with features that require a computer. Even at \$699 (or \$399 for the 4,800bps version), that package almost qualifies as a bargain.

By any measure, CFAX is strong on features. A partial list includes background operation; the ability to capture Epson FX text and graphics printer output from an application program and send it as a fax; the ability to convert files from PC Paintbrush Plus, Dr. Halo, and Windows Paint format; the ability to schedule fax transmissions and create distribution lists; and the ability to transfer binary files at 9.600 bps with another CFAX system. Of special note is a memo feature that lets you create and fax a short note completely within the fax program.

DOING IT YOUR WAY At least as important as the sheer number of features is that CFAX often offers more than one way to handle a given function. For example, you can scan a full-page image and send it in a single step, or you can convert it as a separate step from sending. If you scan the



FACT FILE

The Complete Fax/9600 The Complete PC

521 Cottonwood Dr. Milpitas, CA 95035

(408) 434-0145 List Price: \$699; Hayes-compatible modem,

Requires: 512K RAM; hard disk; IBM PC, XT, AT, PS/2 Model 25 or 30, or compatible; CGA, EGA, VGA, or Hercules graphics adapter: DOS 3.1 or later.

In Short: The Complete Fax/9600 manages to offer both an abundance of features and a menu structure that is easy to learn and use. Some of its more notable features are background operation, the ability to capture print output to send as a fax, and the ability to convert files from PC Paintbrush Plus, Dr. Halo, and Windows Paint formats

CIRCLE 400 ON READER SERVICE CARD



The \$699 Complete Fax/9600 allows background operation. It can also capture Epson FX text and graphics printer output from an application program and send it as a fax; convert files from PC-Paintbrush Plus, Dr. Halo, and Windows Paint formats; schedule fax transmissions and create distribution lists; and transfer binary files at 9,600 bps with another 1/4-length Complete Fax/9600 system.

image as a separate step, you can designate resolution, image type (line drawing or photograph), and dithering scheme (for gray-scale images).

Very much on the plus side, CFAX offers a menu structure that makes most features easy to find when you need them and easy to ignore when you don't. With few exceptions, the program unfolds naturally. presenting appropriate choices at the right

For example, suppose you want to fax an ASCII file. You have only to pick Send FAXes from the first-level menu, then enter the filename and phone number in the Send screen. If you can't remember the filename, you choose List, then DOS Directory, enter the name of the directory to look in, and pick the file from the list. Similarly, you can type the phone number, or you can ask to see a list of entries in the phone book and choose from that list.

Also noteworthy is a context-sensitive help feature that is informative enough so that you may never need to look at the manual. And in keeping with the rest of the package, the manual is also well organized and well written

MAKING IT EASY Even installation is painless. The 3/4-length board includes a bank of DIP switches for controlling the CFAX address and interrupts. The settings are fully covered in an appendix in the manual, though in most cases you should be able to use factory settings and simply plug in the board.

Installing the software is even easier. An install program asks a few questions about your system-including type of printer and scanner if you have one-then copies all files to the directory of your choice. If you change your hardware, you simply rerun the install program from your hard disk.

Once installed, CFAX runs as two modules. The background module answers the phone for incoming faxes, sends outgoing faxes, and, if you specify, prints faxes automatically. The foreground module allows manual control over such functions as scanning, designating files to send, and creating distribution lists. The background module also offers a pop-up screen that lets you send faxes from within virtually any program.

NEARLY PERFECT On PC Labs' error-handling tests, CFAX performed well. but with one exception. When we logged on to an empty floppy disk drive and then responded to the Abort, Retry, Ignore message with an "I," the system hung. A technical representative from The Complete PC said that he could not reproduce the problem, but we were able to produce it repeatedly on two different computers.

As of this writing, CFAX supports full-

It's 11:05am. If you had our accounting software, you'd know where your business is.

11:05

"Great, back orders are down. Now let's push those sales."

11:06

"Gross Margins look good. We can pick up — sales volume with some promotions."

dPayables MultiMet Praxis Products, Inc Business Status Report as of 89/26/88 Al nunice/dStatements dPauables Current Balance: 186532.63 Current Balance: 54632.21 23656.44 PTD Billings: PTD Payables: PTD Payments: PTD Receipts: 53422.23 25978.84 PTD COGS: 22475.84 Approved to Pay 1205.95 Inventory Value 158412.57 d0rders dPurchase Open Pos: Open Orders: 8253.76 49783.56 PID Orders 54725.43 PTD Orders 45125.33 PTD Receipts: PTD Shipments: 55835.12 14937.49 33292.31 PTD Gross Hargin Met Cash Forecast 18378.62 Enter Choice (Forecast/Recalculate/Print/Quit)

11:07

Let's forecast where these numbers will be at the end of the month." 11:08

"Last week's cash forecast was \$4,000. We're looking much better. We can put some into CD's."

11:09

"Cash receipts are up, I can approve a few more P.O.'s."

11:10

"Purchase
Orders are close
to sales this
month. I'll call
Mary and put
the brakes on
any more P.O's
for a wbile."

There's a lot to a business, and it's tough to know where all of it is, all of the time.

That is, unless you have the Database Accounting Library™ from SBT.

It offers a Business Status Report that is a complete control panel for your business. A set of instruments that gives you up-to-the-second status on what you're selling and what

you're buying. On what you owe and what you're owed. Right up to the last item entered.

Which means you know virtually everything about where your business is, right now.

And with a final knowledge you can expire those current sent but to the end of the gooth.

And with a single keystroke you can project those current results to the end of the month. So you can decide when to trim and when to spend.

We also provide 15 different accounting modules to choose from. That means your business gets exactly the applications it needs, and only those it needs.

Modules start at just \$295, run on all popular computers and multi-user environments, and come with an unprecedented five year warranty.

So at 11:05, or any other time of the day, the SBT Database Accounting Library can help you know exactly

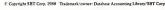
Call your nearest SBT dealer today. Or call SBT at 800/227-7193 (415/331-9900 within California). Or write us at One Harbor Drive. Sausalito. CA 94965.

CIRCLE 470 ON READER SERVICE CARD

where your business is.

More than accounting, we stand for better business.

SBT





■ FAX SYSTEMS

page scanners from only four vendors: Hewlett-Packard Scanlet, Canon IX-12, Microtek (any model), and DEST (any model). In addition, the program will work with The Complete PC's Hand Scanner for scanning less than a full page. According to a Complete PC representative, by the time you read this, the company will be offering its own full-page scanner.

Scanner control is superb. In our tests using the HP Scanlet, the sample color wheel and photo retained far more detail and shading than in most other fax packages—or scanner packages for that matter. If you need to fax photos frequently, this is an inmortant issue to consider

As should be clear, The Complete Fax/9600 not only offers a full range of features but does so in an attractive package that is easy to learn and use. Whether your faxing needs are occasional, or you want to supplement your standalone fax machine with computer-based capabilities, the combination offered by The Complete Fax/9600 is hard to beat.

-M. David Stone

DEST CORP.

Facsimile Pack

Given DEST Corp,'s well-established reputation as a manufacturer of OCR scanners and software, it was only logical that it should branch out into the fax market. The vendor's latest entry is the Facsimile Pack, a minor revision of DEST's EZ-FAX. which was reviewed in PC Magazine's last roundup of fax boards (for the full text of that review, see the June 28, 1988, issue). According to a DEST representative, DEST improved the system's communications capabilities, leading to fewer transmission errors. It also dropped the price of the system from \$1,495 to \$995, which puts the price of this full-length board more in line with that of other boards

The Facsimile Pack's software features a logical menu structure, excellent context-sensitive help, and the ability to convert and send ASCII, Dr. Halo, and PC Painthrach flies in a single step. The hardware includes an on-board microprocessor with 8K of RAM to manage background operation. Both software and hardware are easy to install. The factory-set DIP switch settines should work in most cases. You



The \$995 Facsimile Pack from DEST Corp. includes a full-length 9.000-bps board that has a built-in microprocessor with 8K of RAM to manage background operation. The accompanying software features a logical menu structure, excellent context-sensitive help, and lets you convert and send ASCH, Dr. Halo, and PC Paintbrush files in a single step.

can plug an optional scanner like the DEST PC Scan 1000 or PC Scan 2000 directly into the board.

SCHEDULES AND PHONE BOOKS

If you need to handle a high volume of faxes, you'll be glad to know that the Facsimile Pack's scheduler and phone book have no size limit other than that imposed by the disk space that is made available to them, and both are easy to learn and use. To schedule a transmission, for example, you have only to select T for Transmit and then T, F, or S for Text, Fax file, or Scanned pages. You then enter the name of the file and the phone number by typing them in or by popping up a list, highlighting your choice, and hitting Return. You can also enter an ID name associated with a phone number.

Also helpful is the Facsimile Pack's ability to intercept printer output from any application and send it as a fax. A related feature lets you use your word processor's mail-merge function to create distribution lists by adding a command in your master document. The Facsimile Pack will read phone numbers from a data file and merge-fax the documents rather than merge-print them. You can also create distribution lists through a DOS batch file.

Any fax package can hog large amounts of disk space. Facsimile Pack has options for deleting files automatically after they have been printed, sent, or otherwise processed. Another option lets you delete files after a specified number of days. And



FACI FILE
Facsimile Pack
DEST Corp.
1201 Cadillac Ct.
Milpitas, CA 95035

(408) 946-7100 List Price: 5995 Requires: 640K RAM (140K of which is free RAM); hard disk; IBM PC, XT, AT, PS/2 Model 30, or compatible; CGA, EGA, VGA, or Hercules graphics card; DOS 2.0 or later.

In Short: Facsimile Pack offers ease of use and the ability to mepe fax documents with data files by way of your word processor. While it can handle a high volume of faxes well, it suffers from many small oversights: for example, it can't receive faxes properly sent at high resolution.

GROLE 40 IO READER SERVICE CARD

since the program's display feature requires the creation of a separate version of the file, it's worth noting that you have the choice of creating such files automatically, manually, or not at all.

ERRORS AND SHORTCOMINGS

The Facsimile Pack could have fared better on the PC Labs error-handling tests. If you issue the Type command to a file and stop it with Ctrl-S or log on to an empty drive, the system will not acknowledge an incoming call until you restart the displaying of the file or fix the drive error. It will also let you reboot with Ctrl-Alt-Del during a



This little piggy loves MicroFax.

Because MicroFax[™] from Datacopy lets you turn your PC

into a fax machine for only \$695. A fraction of what stand-alone machines

cost but with the same sophisticated fax capabilities. And that makes MicroFax the smart solution for the fax needs of any PC owner.

SIMPLICITY

MicroFax is simple to use. It's an add-on fax board for the PC which sends and receives docu-

ments worldwide at 9600 bps no matter what you're doing, because MicroFax operates unattended.

unattended. Plus it works simultaneously while other programs are running, so valuable work time is never wasted.

SOPHISTICATION

MicroFax is the first true integration of fax and PC technologies. Now, you can communicate text, graphics and computer files to and from computers and fax machines with a 1200 baud Hayes* compatible ASCII modern.

Moreover, you can transfer computer files between PCs in considerably less time at 9600 bps.

In total, that's a powerful line of communication.

BYTE MAGAZINE

And we're not the only ones who think so. Recently BYTE Magazine reviewed the Datacopy MicroFax and judged it:

"... the standard against which to measure other PC fax cards."

CIRCLE 247 ON READER SERVICE CARD

So consider MicroFax the most sophisticated

and convenient

fax card available. And you'll love us for more than just the money.

For more information, call Datacopy direct at (800) 821-2898.





■ FAX SYSTEMS

fax transmission. What's more, the manual warns you that using FORMAT. DSKCHK, or DISKCOMP during a fax transfer will result in loss of data.

The program has other shortcomings as well. For example, high-resolution transmission and conversions from fax to graphics formats are available only from the DOS prompt. Although running Facsimile Pack from DOS is a nice option-especially to let you batch activities that you run frequently-these features should also be available from the menus.

Also be aware that high-resolution mode is supported only for transmission. and only for converted graphics files. The board interprets all incoming faxes as low resolution (100 vertical lines), so that a high-resolution fax will expand to twice its original height. Other limitations are the lack of graphics features beyond a simple display function and error codes that are limited to arcane numbers (though these are thoroughly explained in the manual).

If security is an issue, you can purchase an optional encryption chip from DEST for \$195. Also optional is a \$129 Bell 212 1,200-bps modem that installs piggyback on the fax board. There is even a version of Facsimile Pack for use with Novell networks. A new version of the program is expected by mid-1989. According to DEST, this will offer EMS support, an unload feature to clear RAM space, and support for legal-sized printouts.

In its current version, the Facsimile Pack clearly has some limitations, and even at \$995 seems a bit expensive for the features it offers. But the program is easy to set up and use, and it handles heavy fax activity well. For those with high-volume faxing needs, it is certainly worth looking at.-John Britton

GAMMALINK GammaFax

In its earlier incarnation, GammaLink's GammaFax was a hacker's delight but a casual user's despair. A script language let you automate a host of powerful functions, but even many simple operations had to be performed through unwieldy command strings at the DOS prompt. With its current version, the GammaFax software has entered the modern world, offering com-



The \$695 GammaFax half-length 9,600-bps card from GammaLink comes with menudriven software that has copious context-sensitive on-line help, plus a powerful script language for automating complex procedures. An optional CADFax package (\$395) converts AutoCAD and HPGL files to fax format.

pletely menu-driven operation and copious context-sensitive on-line help.

Besides the standard \$695 GammaFax half-length card that we tested, Gamma-Link offers the \$895 GammaFax Plus. which includes a second modern for standard communications functions, and the \$1,095 GammaFax CP, which sports an on-board 80188 microprocessor and 256K RAM. The GammaFax CP was unavailable for testing, but according to the vendor it offers speedier performance in background mode and can convert files to fax format on the fly while transmitting them. You can also have more than one Gamma-Fax CP operating simultaneously in a single computer. An optional CADFax package (\$395) lets you convert AutoCAD and HPGL files to fax format

SIMPLE BUT SOPHISTICATED The GammaFax software makes transmitting disk files about as simple as it can be. You just type in the filename and the phone number or select the file from an on-screen directory and choose the phone number from one of the phone books you can create. You can also tag several files and several different phone numbers to create distribution lists, which you can save for reuse later.

A third transmission option exemplifies the level of sophistication the GammaFax



Cammakay GammaLink 2452 Emharcadem Way Palo Alto, CA 94303 (415) 856-7421 List Price: \$695 Requires: 512K RAM; hard disk; IBM PC.

XT, AT, PS/2, or compatible; CGA, EGA, VGA, or Hercules graphics card; DOS 3.0 or In Short: GammaFax combines power and

flexibility with a simple, easy-to-use menu system. It should satisfy the needs of users at all levels of sophistication.

software has achieved. You can enter selection criteria for the Class and Category fields of a phone book record and then automatically broadcast files to each number that meets the criteria.

The program does everything else automatically. It determines each file's format. converts it to fax format, and then dials each number. If it can't get through, it waits a user-specified length of time and then redials the number of times you have specified beforehand. You can even opt to have it put any unsuccessfully dialed phone numbers at the end of the queue for LASER H) MODEM PRINTER

without a network

Before buying a LAN, take a hard look at your company's needs. Then take a look at the Logical Connection.

It could be all the network you need. A peripheral sharing device. Simple and affordable. No cards. No file server. No node disks. Just your equipment, logically connected for economy and ease of use.

Connect up to six PCs on each Logical Connection. To lasers, Printers, Plotters, Modems. Switch from one device to another from any connected PC. Pop up the

Link as many as 45 Logical Connections to really expand your connectivity power. Up to 225 users sharing

on-screen menu, and it's done.

those costly peripherals.

Make the logical choice. Network without a network. For as little as \$700. From the makers

of Fastback Plus.



Fifth Generation

All the network most users need.

CIRCLE 288 ON READER SERVICE CARD

Call for details on our Corporate/Dealer Evaluation Program Fifth Generation Systems, Inc. • 11200 Industriplex Blvd. • Baton Rouge, LA 70809 • (800) 873-4384, (504) 291-7221



Benchmark Tests: Fax Boards

S ince we last tested fax boards for PCs, the field has broadened and the quality has improved. But the more things change, the more they stay the same: the performance times yielded by this crop of fax boards proved similar to those of the last group.

in the sake of comparison, we tested the transmission time between two standations fax machines, each of them a Canon FaxPhona 20. In the DF-Ear transmission test, only five of the 15 tested fax boards (the AT61 Fax Connection, the Pamiris FA10, the FaxMail 96, the Pamasonic FX-BM69+ Fax Partner, and the Connection CoProcessor) were taster than the standalone pair with its 77-second timing.

The GammaFax, which produced very poor timings on PC Labs Fax Print benchmark test last year, now achieves a respectable score of 99 seconds. Several other boards also substantially improved their print speeds, leaving behind The Complete Fax/9600, which once again delivered a poor print time of almost 4 minutes.

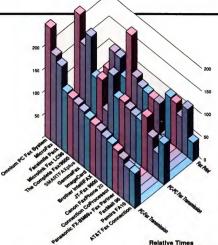
Except in the case of the ATAT Fax Connection, fast printing did not necessarily coincide with fast transmission. Not only was the ATAT Fax Connection the fastest in the PCF-Fax Transmission benchmark test, it was also the fastest in our Fax Print benchmark test, delivering a paper copy of our 2-page fax transmission in less than a minute.

As in the past, some products were tested with the Canon FaxPhone 20 and others with the Ricch FAX60, because a number of boards had trouble handshaking with the former machine. The choice of a receiving fax machine normally does not affect performance times.

The PC-Fax Transmission benchmark test times the transmission (without printing) of a 2-page letter in an ASCII text file. Each product is timed on an 8-MHz IBM PC AT, transferring the test file to a standalone fax machine.

The PC-PC Fax Transmission benchmark test times each package as it transfers the same file to an identically configured AT with the same model fax board. This test lets the package benefit from any proprietary features that might override the standaione fax standard.

The Fax Print benchmark test times the printing of the 2-page test letter received in the fax transmission benchmark tests. An HP Leser-let Series II is used for this test, and timing is measured from the issue of the print command to the completion of printing.



Performance Times

Relative Times (Connection CoProcessor = 100)

(Times given in seconds)			
	PC-Fax Transmission	PC-PC Fax Transmission	Fax Print
Omnium PC Fax System	182	170	71
MicroFax	144	126	137
Facsimile Pack	135	148	135
Microlink Fax LC96	99	86	86
The Complete Fax/9600	97	91	231
SMARTFAXplus	94	46	116
GammaFax	90	114	99
ImageCard	86	82	94
Brother IntelliFAX	83	84	92
JT-Fax 9600	81	80	92
Canon FaxPhone 20	77°	77*	N/A
Connection CoProcessor	74	76	139
Panasonic FX-BM89+ Fax Partner	70	90	135
FaxMall 96	64	63	105
Pamirs FA10	57	44	145
AT&T Fax Connection	56	68	56

* Transmission between two standalone FaxPhone 20 machines.

N/A—Not applicable: the FaxPhone 20 does not print to an HP LaserJet, nor does it save fax output for later printing

The output of a transmission to a fax machine from a PC may look better ham what results when you send a document from one fax machine to another. The reason is that standard fax machines scan the document before sending it over the phone line, and some resolution is lost in the scanning process. PC fax skips the scanning process, sending the document file directly from your computer. The resolution of all faxed output conforms to the Group 3 standard of 200 dots per inch.

You can see the degradation in the image of a text file printed on the HP LaserJet Series II and sent from one fax machine to

another, compared with the quality of text files sent by the PC (ax packages reviewed here. Of course, how well you like the output produced by a PC (ax package may depend on the fortis the package uses. Those we tested have their own fonts, and the user has little control over their appearance. Note that 7 of the 15 PC (ax packages—AT&T Fax Connection, FaxMail 96, Brother IntelliFAX, The Complete Fax/960, GammaFax, JT-Fax 9600, and ImageGard—do not place a slash through the number 0 to distinguish it from the letter O.

HP LaserJet Series II

project before, you over 7,500 words of a board and write a shi is simple. With multid the reviews to have

Fax machine

project before, you over 7,500 words of board and write a shis simple. With multiple the reviews to have

Omnium PC Fax System

project before, you over 7,500 words of board and write a sh is simple. With muled the reviews to hav

MicroFax

project before, you' over 7,500 words of a board and write a sho is simple. With mult d the reviews to have

Facsimile Pack

Project before, you're over 7,500 words of adv board and write a short is simple. With multir ed the reviews to have s

Microlink Fax LC96

project before, you'r over 7,500 words of ad board and write a shor is simple. With multi ad the reviews to have

The Complete Fax/9600

project before, you'r over 7,500 words of ad board and write a shor is simple. With multi ad the reviews to have

SMARTFAXDius

Project before, you're prolover 7,500 words of advice oboard and write a short is simple. With multiple red the reviews to have some or readers will be left with

GammaFax

project before, you're prover 7,500 words of advice board and write a short is simple. With multiple of the reviews to have some

ImageCard

project before, you'r over 7,500 words of ad board and write a shor is simple. With multi ed the reviews to have a readers will be left

Brother IntelliFAX

project before, you're pover 7,500 words of advice board and write a short is simple. With multipled the reviews to have son

JT-Fax 9600

project before, you're pover 7,500 words of advice board and write a short is simple. With multipled the reviews to have son

Connection CoProcessor

project before, you' over 7,500 words of a board and write a sho is simple. With mult ad the reviews to have

Panasonic FX-BM89+ Fax Partner

project before, you' over 7,500 words of a board and write a sho is simple. With mult d the reviews to have

FaxMaii 96

project before, you'
over 7,500 words of a
board and write a sho
is simple. With mult
d the reviews to have

Pamirs FA10

Project before, you over 7,500 words of board and write a shis simple. With multide the reviews to have readers will be lef

AT&T Fax Connection

project before, you over 7,500 words of board and write a she is simple. With muled the reviews to have retry after it has attempted all other numbers.

Sent and Received Logs record all successful and unsuccessful transmissions, along with time, date, and length of each transmission. A third log shows all files in the queue waiting to be sent. You can cursor to any log entry and view, print, or retransmit your selection.

A PLETHORA OF OPTIONS It's hard to think of transmission options that GammaLink has overlooked. This versatile product's capabilities include turnaround polling and transmission at a later time or date. The powerful script language is still there for automating complex procedures by means of batch files. The program can run in background mode, occupying a little under 200K of RAM (65K with the GammaFax CP). You can even send any sort of data file from one GammaFax board to another.

GammaFax had no trouble performing all our tests at 9,600 bps and turned in respectable performance times. It could even handle the 28-inch-long test page sent from our fax machine. The hard copy generated by GammaFax transmissions was generally of high quality. The graphics file transmitted to our fax machine produced an exceptionally clear, well-defined image mapped pixel to pixel, and text files were very readable. The printout of the PC-to-PC graphics file transmission wasn't as good, however.

The only problem we encountered was that when we transmitted an image scanned by the Hewlett-Packard Scanlet, it came out at double height. GammaLink told us that this was because of a bug in its driver for the Scanlet, which would be fixed in the next release.

On-screen display of faxed files is also good. You can zoom in or out on an image, scroll it, rotate it, or change it to black on white. There are no graphics editing capabilities, but you can extract part of a fax format file. You can also append a graphics file to an ASCII file by means of the rather cumbersome process of appending a command to the ASCII text with a word processor.

The GammaFax manual is for the most part clear and well illustrated. Unfortunately, all the documentation for the script language is in the form of an apparently hastily assembled 150K disk file. Gamma-Link says it will revise this and put it on paper in a future release.

GammaFax's combination of power and flexibility with a simple, easy-to-use menu system should satisfy the needs of just about any user. It offers a high level of functionality at a reasonable price, proving that this fax board has finally come of age.—Robert Kendall

INTEL PCEO Connection CoProcessor

You always knew that Intel built solid, dependable hardware. But did you also know that the company designs equally dependable software? You'll see the result of that strong combination in the Connection Co-Processor, a 5995 fax system that helps define a standard of excellence for other systems to live up to.

As the name implies, the Connection CoProcessor includes an on-board micro-processor. While this feature is not unique, it is certainly a big plus. It allows true background operation, letting the full-length board go about its business while you go about yours. The Connection Co-Processor will occasionally steal time from a foreground application, but only when it needs to read from or write to disk.

The board itself is noteworthy for other reasons as well. Besides the usual modular



Connection Corrocessor Intel PCEO Mailstop CO3-07 5200 NE Elam Young Pkwy Hillsboro, OR 97124-6497 (800) 538-3373 List Price: \$995

Requires: 640K RAM; IBM PC, XT, AT, PS 2 Model 30, and many compatibles, in-cluding Compaq; CGA, MCGA, EGA, VGA, or Hercules monochrome-compatible graphics card; DOS 3.0 or later.

In Short: While its list price makes the Connection CoProcessor one of the more expensive fax packages, the excellent error ham-

In Short: While is, list price makes the Connection CoProcessor one of the more expensive lax packages, the excellent error handling, intuitive menu structure, free technical support, and 5-year replacement warranty combine to make it a good choice. In addition, the inclusion of CAS support may turn out to be a valuable feature.

phone connectors, it sports a connector for the AppleTalk network. As of this writing, the connector is reserved for future use. According to Intel, the connector may disappear from future versions of the board, but it may also serve as a basis for an optional networking capability.

CAS SUPPORT Also remarkable is the fact that the Connection CoProcessor is the first piece of hardware to support CAS (also known as DICAS), the DCA/Intel



The first piece of hardware to support CAS (the DCAIIntel Communicating Applications Specification), the full-length S995 Connection CoProcessor includes an on-board microprocessor that allows true background operation. Besides the usual modular phone connectors, this 9,600-bps board sports a connector for the Apple Talk network.

a Stroke of Genius

Features	ProDesigner VGA Plus	ProDesigner VGA	Designer 800 VGA
Bus & BIOS Support	16 and 8 Bst	16 and 8 Bst	8 Bit
Extended VGA Modes			
360x480 256 colors	Yes	Yes	Yes
640x350 256 colors	Yes	With User Upgrade	With User Upgrade
640x480 256 colors	Yes	With User Upgrade	With User Upgrade
800x600 16 colors*	Yes	Yes	Yes
800x600 256 colors*	Yes	With User Upgrade	With User Uperade
1024x768 16 colors*	Yes	With User Upgrade	No
3 - 132 column 16 color modes	Yes	Yes	Yes
100% Register and BIOS Computible with /GA, MCGA, EGA, CGA, MDA and Hercules	Yes	Yes	Yes
Auto Mode Switch, Auto 8/16 Bus Sense and Auto Monstor Select	Yes	Yes	No

Supports these standards on both interloced (IBM 8514 and compatibles) and non-interloced (NEC Multivoir XL and compatibles) monitors.

Suggested Retail Price

The Orchid ProDesigner.™

Dip your brushes into the Orchid palette to create picture-perfect images.

With 256 high resolution colors, nine extended modes, and a 16-bit bus, the Orchid ProDesigner series brings your creations to life at lightning speed. The product line is register-level compatible, upgradeable, and affordable. Whether you're using desktop publishing, CAD/CAM or business applications, you'll see brilliant designs from a colorful perspective. The ProDesigner series lets you accent your work with vivid graphics.

Installation is a snap. ProDesigner automatically configures to your monitor and 8 or 16-bit bus. And because you use more than one application, ProDesigner ingeniously selects the correct mode on its own. So you can concentrate on unleashing your genius into the creative world of Orchid graphics.

ProDesigner, Designer 800 and Orchid are trademarks of Orchid Technology. IBM, VGA, MCGA, EGA, CGA, and MDA are trademarks of International Business Machines. All other products are the trademarks of their respective manufacturers.

ORCHID TECHNOLOGY 45365 Northport Loop West Fremont, CA 94538 Tel: (415) 683-0300

ORCHID (EUROPE) LTD. Basingstoke, U.K. Tel: +44 256-479898



Communicating Applications Specification. In principle, CAS will let any software developer add background communications capability (including fax capability) to any application. A word processor, spreadsheet, or database program could pass information to the Connection CoProcessor or other CAS hardware for transmission as fax or data. (For more information on CAS, see the introduction that precedes these reviews.)

Given the promotion of CAS that accompanied the introduction of the Connection CoProcessor, and given a name that clearly reflects Intel's concentration on hardware, you might not expect much

The Connection CoProcessor helps define a standard of excellence for other fax systems to live up to.

from the software side of this system. You'd be wrong: the software is as well designed as the hardware.

The software consists of two separate modules. A background module handles the actual communications. A foreground module takes charge of control functions, letting you designate such particulars as what faxes to send, when to send them, and to whom.

The background module is notable for its excellent error handling. For example, unlike most boards, the Connection Co-Processor breezed through one of the trickier PC Labs benchmark tests, which involves logging on to an empty drive while a fax is being transmitted. Its one failing was in letting the Ctrl-Alt-Del key combination reboot the computer in the middle of a fax transmission. I'd rather see the program trap the Ctrl-Alt-Del combination, warn that a fax transmission is in progress, and ask if you really want to reboot.

MENUS MAKE IT EASY. Also on the plus side, the foreground module offers a remarkably easy-to-use menu system. For instance, to send a fax, you choose Fax, Send Fax, then change directories or select one or more files by highlighting each and hitting Return. Continuing with the menus, you select any combination of individuals and groups from your phone book, then choose time to send, resolution (standard or fine), text size (normal or compressed), and whether to send a cover page. As you finish each of these steps, the program automatically takes you to the next. And if any step is not immediately obvious, you can call up context-sensitive help for a detailed explanation. The foreground module also incorporates PC Paintbrush as its graphics editor.

You can use the fax modem for file transfer at 9,600 bps, but only if there's a Connection CoProcessor at the other end. Similarly, you'll also find an e-mail feature that works only with another Connection CoProcessor. The e-mail feature lets you create, edit, forward, send, and receive messages. This could be useful if, for example, your company standardizes on the Connection CoProcessor. As a bonus, you can use the text editor in the e-mail module to create documents to send as faxes.

As you might expect of an Intel product. He Connection CoProcessor supports LIM EMS 3.2 and 4.0. As tested without expanded memory, the software needs about 74K of conventional memory. According to Intel, it will use only about 6K with EMS.

WHAT'S MISSING? The only important feature missing from this package is the ability to capture screens or printer output from other applications. Apparently, Intel left out this capability on the grounds that other applications should supply it through CAS. Alas, that won't help much unless—or until—CAS is widely used.

Finally, there is the issue of cost. At 5995, the Connection CoProcessor is one of the more expensive fax packages, costing even more than some fax machines. (In part, the high price of the Connection Co-Processor is mitigated by the 5-year replacement warranty and the toll-free technical support that come with the board.)

And if you add an extra \$295 for an optional 2,400-bps modern, you wind up with even less of a bargain. Much of the Connection CoProcessor's value will depend on how widely CAS is accepted, an issue that is far from settled. Still, if you don't mind the price and judge strictly by quality, the Connection CoProcessor is a clear winner.—M. David Stone

MICROLINK INTERNATIONAL INC. Microlink Fax LC96

Everything about Microlink's Fax LC96 is micro-sized: the short-slot board, the 60-page children's-book-sized manual, the inexpensive price tag, and, in keeping with the tradition, the product's list of features. If you're looking for an economical fax board that handles the basics without any of the frills, the \$499 Microlink Fax LC96 is a viable option. But there are a few limitations you should be aware of ew limitations you should be aware the should be aware the

The best news is that your system will be up and running moments after you've opened the package. It's easy to install the board and configure it for a number of telephone installations (PBX, dedicated, and KSU Key Systems), requiring that you merely adjust a few jumper settings. The software includes an installation program



Microlink Fax LC96 Microlink International Inc. 4064 McConnell Dr.

Burnady, B.C. Canada V5A 3A8 (604) 420-0366 List Price: \$400

Requires: 512K RAM (640K and hard disk recommended); CGA, EGA, or Hercules monochrome graphics card; DOS 2.1 or

In Short: A micro-sized fax board with a micro-sized manual and price tag. If you stick to basic transmissions, this board will suffice. But if you want to send multiple messages, print multiple page documents, combine conversions with transmission, and edit graphics, you'll find that this board falls short

CIRCLE 404 ON READER SERVICE CARD



COREL announces the finest in data security and mass storage for Novell Networks.

As the world's leading developer of WORM (Write Once Read Many) interface software for IBM and Apple Mac computers, COREL brings it's record of software excellence to the network environment.

Now, Novell Netware 2.15 has a new storage solution breakthrough. COREL optical disk subsystems provide the ultimate back-up and highest security options available.

Operating on the network file server, COREL's optical software supports elevator seeking, directory hashing, and directory caching. Complete access across Network Bridges let you support and run even your largest applications. No extra hard disk space or workstation memory is required.

Optical storage gives you the potential for infinite capacity since removable optical cartridges are used. And security is insured with the write-once character of the technology. You'll never worry about losing data again.

COREL software is completely compatible with Novell Netware utilities, security levels, and all existing applications. The world's leading developer of WORM interface software invites you to make the networking breakthrough. For details, contact COREL Systems today! CIRCLE 370 OR READER SERVICE CARD





Microlink's \$499 Fax LC96 is an economical short-slot 9,600-bps board that handles the basies without any frills. It's easy to install and configure for various telephone installations, requiring you merely to adjust a few jumper settings.

that configures your equipment and will even modify your AUTOEXEC.BAT file to run the program in the background if you prefer. (Unfortunately, there is no way to remove the resident portion of the program without rebooting the machine.)

The Fax LC96 software relies on a series of easy-to-use pop-up menus. You activate menu choices by pressing function keys. The menus allow you to handle most varieties of send (with/without dial, delay time, select phone number from directory, and so on) and receive (auto or manual). A pop-up country and city code finder is a helpful utility.

The program supports a good number of file format conversions. ASCII, Dr. Halo, TIFF, PC Paintbrush, and Windows Paint. However, you'll have to convert the files in a separate step prior to transmission. There are no facilities to do this as you transmit or to convert from a fax format to another format. Microlink says it plans to include a fax-to-PC Paintbrush conversion facility shortly. Since there's no way to pop up a listing of files from the conversion menus, you'll need to rely on memory or make a trip back to DOS to hunt down your filename.

PSEUDO-FEEDBACK The software offers very little feedback while it is engaged in transmission. What you often get

is a kind of pseudo-feedback: you get the appearance of feedback when in fact things are really going awry. For example, during transmission a pop-up box with the word Transmitting appears the instant that you specify the Dial command. The box is supposed to remain on-screen until the process is complete. But at certain times the "transmitting" message remained in place even when the process had failed. Packages that display status information messages (waiting for ring, dialing, 50 percent done, and so forth) are considerably more helpful. On the other hand, the program does make sure that an error condition is properly flagged in the activity log.

The program reacts similarly during printing: a pop-up box that says 'processing data' appears on-screen even when the printer is working correctly. Finally, the program could not transmit our 28-inch paper, it's limited to a slightly larger than legal-sized format.

Microlink offers few accessory facilities. There is no text editor and no way to attach signature and letterhead files. You are permitted to view a graphics file onscreen, but the FAX LC96 software lacks facilities for editing the file. There is no control over fine (as opposed to normal) resolution, nor are there any gray-scale capabilities. However, the system transmitted all text and graphics in the proper aspect ratio. Fonts have no support either, although the program can handle the AS-CII extended character set. In addition, there are some undocumented commands, such as one that moves you to the next page in the viewer.

Certain enhancements to the send menu are helpful, but not enough to satisfy the needs of frequent fax users. There are no facilities for polling. While you can easily send a delayed fax transmission or broadcast a single message to a group of recipients via a phone directory, the program lacks any facility for creating a distribution list to transmit multiple messages-unless you name each message identically and give them consecutively numbered extensions. Furthermore, although the package stores consecutive pages as FAX01.301 and FAX01.302, you cannot print multiple-page documents without specifying each page as a separate file.

In the list of the Fax LC96's omissions, there is a curious inclusion. The Fax LC96 can send binary files via a 9,600 bit-per-second high-speed file transfer. When the manufacturer wanted to send me a bit of additional software code, this feature was a helpful addition. However, you can transfer files only to another Fax LC96 or other Microlink fax board. A micro problem?—Robin Raskin

OMNIUM CORP.

Omnium PC Fax System Does your pioneer spirit rebel against the

Does your pioneer spirit rebel against the slick sophistication of most recent fax products? Do you feel an uncontrollable urge to roll up your flannel sleeves, stomp into the wilderness, and dig down to the frontier roots of the fax phenomenon? If so, Omnium Corp.'s \$599 Omnium PC Fax System is the board you've been itching for.

Minnesota-based Omnium Corp.
doesn't make boards for city slickers who
can't imagine living without hot-and-cold
running water. City slickers expect their
fax software to take ASCII files found anywhere on their disk and convert them automatically into fax format while transmitting them. Omnium's software can locate
only files stored in the fax directory, and it
makes you convert ASCII files before you
can transmit them. To add to the frontier

YOU'VE JUST READ THAT FAX-MAIL 96 IS ONE OF THE TOP RATED FAX BOARDS.



WE'VE JUST MADE IT 100 TIMES BETTER.

Order now and receive the fastest, fully featured fax board available, now for a limited time only \$499.

Call 1-617-235-3026. Offer expires May 31, 1989.



Brooktrout Technology Incorporated

110 Cedar Street Wellesley Hills, MA 02181 Telephone 617-235-3026 Fax 617-235-0310



The only board tested that transmits at the leisurely pace of 4,800 bps, Omnium Corp.'s \$599 Omnium PC Fax System shows good workmanship and an uncrowded layout. One oddity, however, is a small transformer that pokes through a hole in the back of the board and may interfere with an adjacent card.

challenge, Omnium insists on converting a multipage ASCII file into a group of separate files, one per page. Any incoming multipage file gets the same treatment and is converted into multiple files that you have to read or print separately.

CITY FAX, COUNTRY FAX City slickers expect fax software to report the length of each transmission in the log file and to present error messages in clear English. Omnium makes you get out the calculator to figure out the length of any call and presents errors in the form "ERFLG = 35". If you want to know what the number means, get on the phone to Omnium, and don't waste time looking for explanations in the manual. Whenever the Omnium board sends or receives a file, it displays the hex codes of the first few seconds of data. Real men understand sequences like "B3 A0 A4 B2 09 B4 60" when they see them.

City slickers expect their fax software to receive files in the background while they get other work done. Omnium's foreground-only software takes over your computer whenever you send or receive. City slickers expect their fax software to control a scanner. Omnium expects you to use the scanner manufacturer's software to create. PCX or Dr. Halo files, and then use Omnium's software to convert them into fax format.

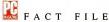
City slickers expect their fax boards to have both a line jack and a phone jack. Omnium gives you one jack only—although it throws in a plastic Y-connector that you can use to plug in a phone.

LIFE IN THE SLOW LANE Frontier folks don't suffer from the same frantic time pressures as city slickers, so they won't mind waiting 30 seconds while Omnium's software converts a 1½-page AS-CII file into two fax files, and then another 2½ minutes while Omnium's hardware transmits the two flex at the leisurely pace of 4,800 bits per second. Frontier typography has never been known for elegance, and Omnium maintains the tradition by using a nearly unreadable font with some letters too thick or too thin, and with the numeral 2 almost indistinguishable from a capital Z.

Omnium doesn't intimidate you with a slick manual or software. As documentation, you get 40 spiral-bound pages, some of them pasted over with foldout updates. And you won't find the manufacturer's address or phone number anywhere in the manual.

The software doesn't let you do anything as simple as press Enter to confirm your choices. Instead, you have to keep pressing F10 as a confirm key when you think you've already told the software everything it needs to know.

When you want to do anything with your fax files, Ormium doesn't even automatically give you a menu of available files. To view a fax, for example, you press V at the main menu to get to the View menu, press F2 to see the list of files (each



Omnium PC Fax System Omnium Corp.

1911 Curve Crest Blvd Stillwater, MN 55082 (P.O. Box 186)

(800) 328-0223 List Price: \$599

Requires: 256K RAM; CGA, EGA, VGA, Hercules monochrome graphics card; DOS 3.0 or later.

In Short: Omnium's foreground-only software has limited capabilities, an unappealing font, and no scanner control. Multipage documents are sent and received as multiple

CIRCLE 405 ON READER SERVICE CARD

file containing a single page), move the cursor to the one you want, then press Enter to move it into the filename field. Since you can choose only one file at a time, this should be enough to get you started—but now you have to press F10 to start the viewer.

After a fairly long wait, you can see the chosen page in white on black. Although most of Omnium's software is menu driven, nothing on the screen even reminds you that to change the scale of the viewed image, you have to press Z and then a number from 1 to 4. You can't change the default scale, which produces an easily readable image with a Hercules card, and a less readable one with an EGA. You have to go through the View-F2-Enter-F10 procedure with every page in a multipage file.

At least the print menu lets you list a series of incoming pages before printing them to an Epson- or HP-compatible printer. But if you want to send a multipage file to more than one destination, you have to prepare a separate list of each destination for each page of the file.

One of the two Omnium boards tested in PC Labs was unable to receive data from the other without timing errors that invariably caused it to break off the transmission. Omnium first traced the problem to the fact that its software is optimized for 256K machines and PC Labs had 640K. But when the other board performed well in the same machine, Omnium's tech support was unable to offer an explanation.





Desktop publishing has never been easier! With DEI's new HANDY SCANNER (HS-3000), scanning BIG pictures has become a breeze.

The HS-3000 is the first hand-heid scanner to offer four (400/300/200/100) DPI resolutions for the IBM PC/XT/AT, PS/2 Models 25/30 and their compatibles. Abic to scan an image 4-1/8" wide, it also has some unique features such as : 32 levels of grey resolution (others only have 16 levels), a fast 7-sec. scanning speed (for 10" at 300 DPI) and a vellow-green light which captures the

reddish skin tones of your images (scanners with red lights just can't see the all-important skin tones), thereby giving you sharper pictures. What's more, a real-time screen display lets you instantly

see your scanned image, so you can quickly make the necessary adjustments, if needed. With its accompanying software, you can quickly

scan, bit-edit, crop, save and use the images under graphics packages such as PageMaker, Ventura, Word-Perfect 5.0. PC Paintbrush + and many others.

You can scan dot matrix, typewriter and laser printer monospaced texts and use them in your word processor. The trainable OCR software has the exclusive ZIP feature which lets you merge 2 scanned pages into one.

The HS-3000 package includes the scanner, interface card, a utility disk, an instruction manual and the HALO DPE graphics editor/layout program.

The HANDY SCANNER 3000 - a truly remarkable package, as only DFI can deliver.



DIAMOND FLOWER ELECTRIC INSTRUMENT CO., (U.S.A.) INC. 2544 Port St., West Sacramento, CA 95691 Tel: (916)373-1234 Fax: (916)373-0221 DIAMOND FLOWER ELECTRIC (NORTHEAST), INC. 5C Joanna Court, East Brunswick, NJ 08816 Tel: (201)390-2815 Fax: (201)390-2817 CIRCLE 742 ON READER SERVICE CARD

■ FAX SYSTEMS

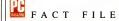
A FEW CONVENIENCES The frontier spirit of the Omnium system allows for a few conveniences. Installation is simple. You can pop up an editor screen and write a message that the program will convert directly to fax format and send. The editor doesn't have word wrap, so you have to press Enter at the end of every line and you can't type more than one screen, but for a quick message it's enough.

Omnium's full-length board shows good workmanship and an uncrowded layout. One oddity is a small transformer that pokes through a hole in the back of the board and may interfere with an adjacent card.

The Omnium PC Fax System works happily with a two-floppy system, and its software is designed to work with 256K of RAM. If you're using this kind of log-cabin system, the Omnium board will fit right in.—Edward Mendelson

PAMIRS BUSINESS INTERNATIONAL CORP. Pamirs FA10

You're asleep at home and your colleague from across the country wants to fax something to you immediately. Ordinarily, you'd have to leave your computer running with the fax software loaded. Not with the Pamirs FA10. This ½-length fax board has an Auto-on option that can sense an incoming fax transmission and then power up your computer system, after



Pamirs Business International Corp. 550 Lake Site Drive, #2 Sunnyvale, CA 94086 (408) 736-2583 List Price: 5565 without Auto-on option (5595 with Auto-on option)

CIRCLE 406 ON READER SERVICE CARD

Pamirs FA10

Requires: 384K RAM (hard disk recommended): CGA, EGA, or Hercules graphics card; DOS 2.0 or later.

In Short: It may lack some of the fancy features of other fax systems, but the Pamirs FA10 is an adequate performer. It can set up 20 different groups of up to 800 numbers each for mass broadcasting of faxes. Software includes a functional word processor.

For \$30 above its list price of \$565, you can purchase the ½-length 9,600-bps Pamirs FA10 with an Auto-on option, which can sense an incoming fax transmission when your computer is turned off, then power up your system. Once the computer is running, the software takes over and receives the fax.

which software takes over and receives the fax. And just so your system doesn't stay on all night, the Auto-on option shuts your system down when it has finished receiving the fax.

The Pamirs FA10 used to come standard with the Auto-on feature and cost \$795. Last December the vendor lowered the price and unbundled that feature from the board. Now you can buy the fax board and software for \$565, or \$595 with the Auto-on feature. The \$30 price differential makes it worth purchasing this option even if you'll use it only infrequently. (The Pamirs system isn't the only one with an automatic power-up option; American Data Technology's SMARTFAXplus has one too, but its feature costs \$299 over the price of the board.)

EDIT AND COMMAND MODES In most other respects, the Pamirs FA10 is a fairly straightforward 9,600-bit-per-second PC fax system. The FA10 includes a minimal editor that lets you write and edit short documents, as well as draw lines and boxes. You can also use the editor to create listings for mass faxing.

The Edit mode is one of the FA10's two opening modes. The other is the Command mode. You'll spend most of your time in the Command mode, which lets you control the system's operations via the function keys; these are displayed in a horizontal bar menu at the bottom of the

screen. Each of the major operational areas has its own "subfunction" menu.

The Pamirs FA10 software operates as a standalone program or as a TSR. When sending or receiving, it comes into the foreground and controls the computer for the duration of the fax transmission or reception. You can turn reception off if you don't want to be interrupted for a time.

The FA10's use of system memory helped it pass our error handling tests with flying colors. The only interruption of a receiving fax occurred when we rebooted the receiving computer, and even then the transmitting computer just rescheduled the fax for later transmission. Putting the receiving machine in situations that frustrated lesser systems, such as reading an empty floppy disk drive or pausing a screen, didn't faze he FA10 at all.

BEYOND FAX MACHINES The FA10 has a reasonable selection of features not found in regular fax machines, though the list is not as extensive as that of some of its competitors. For example, you can use calling groups for distributed faxing, and you also can view and print a transaction log. You cannot, however, capture a screen or capture output formatted for a printer, either for immediate or subsequent transmission. Both normal- and high-resolution modes are available, as are normal and compressed fonts. The FA10 will support gray-scale images from a scanner, but

• Free Customer Sect Guar Sec. Customer Sect Guar Sec. Security Section Sec. Security Security Support Publish-It! in less than an hour.

Without advert

PUBLISH IT!—A full-featured, fully integrated desktop publishing powerhouse with word processing. page layout, typesetting and graphics.

Even if you have no design skills or publishing experience. you can get results in less than an hour with PUBLISH IT!

For all its state-of-the-art ability, PUBLISH IT! is incredibly easy to leam-refreshingly so. PUBLISH IT! combines the familiar GEM User Interface, our Quick-Start Mini-Manual, a full complement of Help Screens, and the practical WYS/WYG (What-You-See-Is-What-You-Get) display-all designed to get you up and running in less than one hour!



- GEM User Interface: It's fast and easy. Pull-down menus, icons, scroll bars and dialogue boxes help you learn and use the program quickly. Your display screen shows you exactly what your final product will look like when you print - What-You-See-Is-What-You-Get.
- Flexible Page Lavout: With your mouse or joystick, and keyboard, you can overlap, reposition, resize, & reshape the text, columns, graphics. Change your layout or experiment almost effortlesslyl
- Built-In Fonts: Choose from over 1200 possible type-style combinations! Opt for bold, italic, underlined, white, light, & superscript or subscript characters. Type sizes range from 7 to 72 point.
- Premium Quality Printouts:

PUBLISH IT! uses a special high density printout format that gives you superior quality printouts on your dot matrix printer.

- Built-in Word Processor: All the features necessary for everyday word processing, plus most of the sophisticated ones found only in more expensive programs.
- Text Importing: Load documents from WORD PERFECT, MICRO-SOFT WORD. WORDSTAR, WORD WRITER PC, or from any other program with an ASCII text format directly into PUBLISH IT! *
- · Built-in Graphic Toolbox: Draw lines, boxes, circles, curved corners, and "freehand" graphics. Plus, choose from a wide variety of built-in line and fill patterns.
- Kerning and Leading

- · Graphics Importing: Directly import graphics from LOTUS 1-2-3, GEM DRAW. GEM GRAPH, GEM SCAN, PC PAINT-BRUSH, and PUBLISHERS PAINTBRUSH.* Then crop and size them to fit.
- Automatic Text Flow and Word Wrap: Flows text from around graphics; and from column to column on the same page, or carries it over to subsequent pages.
- . Multiple Size Page Views: View, edit and layout pages at actual, double or half-size.
- Over 150 Professionally Drawn Graphics & Illustrations.
- Plus, you get worksheets, time-saving
- features, sample documents & more!

Includes 5 1/4" & 31/2" disks; supports hard drive.

\$199.95 Suggested Retail Price . . . (Also available for

Apple lie, lic, liGS Computers . \$129.95) At your local dealer or order direct from Timeworks:

1-312-948-9202.

UWEMOS

444 Lake Cook Rd., Deerfield, IL 60015 312-948-9200

DOCUMENTS DO NOT PRINT OUT IN COLOR Registered trademarks of their respective ©1987 Timeworks, Inc. All Rights Reserved.

TIMEWORKS ACCESSORY PACKS

give you hundreds of new ways to add impact to your PUBLISH IT! documents.

- People, Places & Things: Over 240 ready-to-use graphics & iliustrations.
- Symbols & Slogans: Over 400
- graphics, borders, logos, & more,
- Education Graphics: Over 250 camera-ready school graphics.
- Design Ideas: Over 85 layout ideas for
- ads, newsletters, brochures & more, . Font Pack 1: Includes 8 unique type-
- faces, 7 special effects, in sizes 9 to 72 point
- . Font Pack 2: 8 more typefaces, with 7 special effects, in sizes 9 to 72 point.



■ FAX SYSTEMS

has no specific gray-scale support or enhancement of its own. As a result, the system produced a pretty good replica of our test photo and color wheel, but the results were not as good as those produced by units with specific gray-scale support.

The most recent version of the Pamirs FAIO converts from PC Paintbrush, Dr. Halo, Windows Paint, and ASCII format files, as well as Pamirs's proprietary .IMG file format. The vendor plans to support conversion in the other direction, but there is none so far.

The FA10 works well with fax mafinates and even has a plug for a "local" fax to use a fax machine as a scanner, Pamirs supports the Canon IX-8 and IX-12, HP ScanJet, Microtek MS-200C and MS-300C, Telescan, and Digitech hand-held scanners. It also works with many printers, including the HP LaserJet, but it does not work with PostScript printers.

When the FAIO iransmits to another FAIO unit, it recognizes its sibling and speeds up considerably. Of course, you still have to print the received file to get hard copy, and the Pamirs takes a good while at this task. In general, though, this is a speedy system—at least until printing time.

The Pamirs FA10 is a solid performer with some special features. According to the vendor, future versions of the software will include many of the currently missing features, such as screen and printer capture. For now, however, the system works well, and at just \$565—or \$599 with Auto-om—it's a good deal.—Bruce Brown

PANASONIC CORP. Panasonic FX-BM89+ Fax Partner

Panasonic keeps adding conveniences to its already impressive fax board, the \$999 FX-BM89+ Fax Partner. This is essentially the same board that received a warm welcome to the fax scene in PC Magazine's first roundup (June 28, 1988). It is graced with mostly intuitive menu-driven software that runs in background and TSR modes and supports polling of remote systems. But the plus sign recently added to the ungainly name of this ½-length board signifies some important improvements.



The plus sign added to the ungainly name of Panasonic's \$999 FX-BM89+ Fax Partner signifies some important improvements, among them the fact that you don't need to take the extra step of creating ASCII files in your word processor whenever you want to transmit text via this?//elength 9,600-bps fax board.

With Panasonic's latest software, for example, you don't need to take the annoying extra step of creating ASCII files in your word processor whenever you want to transmit text via the fax board. You tell the installation program which of ten popular word processors you use, and the software automatically converts the word processor's files into fax format when transmitting. Also, you can now transmit directly from a scanner-even a scanner with a multipage feeder-without going through any intermediate file-saving steps. Further improvements, especially in Panasonic's slightly rough-edged graphics and viewing functions, are due in a new version of the software, which should be available by the time you read this review.

CABLE NOT INCLUDED Panasonic's Fax Partner is a well-constructed 3/s-length board with separate jacks for the line and the phone, a built-in speaker, and a small external box with two LEDs that signal when the board is sending or receiving. The one item absent from the package is a standard cable to connect the board to the phone jack in the wall. If you don't have a spare cable, don't try to install this board when the local hardware store is closed, or you'll be very frustrated.

When you go to the hardware store for the cable, also pick up a small screwdriver



Panasonic FX-BM89+ Fax Partner Panasonic Corp. Panasonic Industrial Co. 2 Panasonic Way Secaucus, NJ 07094 (201) 348-7000 List Price: S999

Requires: 640K RAM; minimum 10MB hard disk; CGA, EGA, VGA, or Hercules graphics card; 8-bit expansion slot; DOS 3.1 or later.

In Short: Straightforward to install, the FX-BM89+ offers intuitive software with some awkwardness in the viewer and graphics editor. Efficient memory-resident scheduling and powerful scanner control make this a board worth considering. GRICL ## OF MREADER SERVICE CARD

to pry off the magnet that Panasonic uses for mounting the external LED box to your computer. Cheap magnets and valuable data don't belong in the same room. I had not rouble destroying a floppy with Panasonic's magnet. If you have a Panasonic computer, get the FX-BM88 model instead, with an LED box that replaces the LED box on the front of the machine and doesn't use a magnet.

The Fax Partner lets you print your incoming faxes to just about any standard dot

How to make \$1,000,000 look like a million bucks.

The Atlantic Group of Mutual Funds

Introducing Allways. For 1-2-3 printouts that are worth more than a second glance.

Now you can turn even ordinary 1-2-3° spreadsheets into valuable business assets. Just print them with Allways."

It's the new 1-2-3 add-in designed to make every worksheet you print look crisper, more credible, more presentable than ever before. And it works directly from 1-2-3. With menus and commands that look and feel just like 1-2-3 itself.

We call it "The Spreadsheet Publisher."

That's because Allways gives you such an astonishing range of formatting and printing options. And its "what-you-see-is-what-you-get" display eliminates all the guesswork.

Use up to 8 typefonts on any printout-apply them cell by cell, or throughout ranges.

light important information with light or dark shade. Add drama with solid black. Set off data with vertical or horizontal lines, or enclose it in boxes. And for the bottom line, double-underline.

using its internal fonts, as well as the fonts that come with Allways, With an HP* LaserJet* Plus or Series II, you can also use font cartridges and a full complement of downloadable fonts in sizes from 5 to 24 point.

spreadsheets in 1-2-3 as always. Then pop into Allways to make them look great.

Print them with Allways. It's just \$149.95 at software dealers everywhere. Or direct from Funk Software with your check, Visa or MasterCard.



■ FAX SYSTEMS

matrix or laser printer, and you can use the accompanying fax software to drive scanners made by Panasonic, Canon, Microtek, or HP. You choose files to send from a point-and-shoot menu that can present any directory on any drive. The software automatically converts ASCII files, PC Paintbrush .PCX files, and scanned .DCX files, as well as files from your selected word

The installation program lets you specify a header for each page or a lead file that precedes every transmission, or both. You

The Fax Partner wasn't fazed by any of the error conditions thrown at it during our tests.

can easily create distribution lists and lists of numbers to poll for remote transmissions. Scheduling for later dates and times is easily arranged and just as easily rearranged if you change your mind.

BACKGROUND OPERATIONS Once you schedule your transmissions and set the software to receive automatically, you can return to your other applications and let the 16K resident scheduler lurk in the background. The TSR software won't let you reboot during a transmission, and it wasn't fazed by any of the error conditions thrown at it by the PC Labs performance tests. You can set up the software to print all incoming faxes automatically, but the program can do this only while you run it in the foreground.

The built-in fax viewer, a modified subset of ZSoft's PC Paintbrush is slower than it ought to be and uses a completely different menu structure from that of the main software. You'll need a mouse if you don't want to waste your time using the arrow keys to push the pointer across the menu a millimeter at a time. The viewer includes an option to print a fax in highresolution mode. You should use it if you want decent printouts, because the lowresolution mode available from the faxprinting menu in the main part of the software tends to give grainy or washed-out graphics images, although text is perfectly readable

When converting text files to fax mode, Panasonic uses a clumsy sans serif font. Its defects are partly balanced by the availability of a compressed font that can be used for spreadsheets or any text up to 132 columns wide. And when you send text or graphics from a scanner through the Fax Partner to a remote fax machine, the results are extremely impressive. PC Labs' test photo and color wheel were reproduced at the remote fax with perhaps the best possible detail available from 200dot-per-inch resolution of the Group 3 fax standard

One of the choices on the software's Utility menu is a graphics editor that turns out to be ZSoft's PC Paintbrush. This is a powerful program that isn't fully integrated into the rest of the software, and many of its functions, such as flipping and inverting areas of the image, would be more useful in the viewer.

Panasonic's board is a combination of minor quirks and major strengths. It's a superb product for sending faxes, and only its awkward graphics functions keep it from being a superb product for receiving.—Edward Mendelson

OUADRAM LIMITED PARTNERSHIP JT-Fax 9600

When PC Magazine reviewed PC fax boards in the June 28, 1988, issue, Quadram's \$395 JT-Fax was a favorite because of its price, features, and intelligent menu structure. It also stood out as a finished product in a field that might have been described as not quite ready for prime time. Quadram still sells the board, which was a bargain then and still is. But with its newest offering, the \$795 JT-Fax 9600, the vendor has addressed the original product's drawbacks: its limitation to 4,800bit-per-second operation and a TSR feature that popped up in the middle of other applications when receiving or sending faxes.

With a price more than double that of the JT-Fax, the JT-Fax 9600 is still a good deal. The maximum transmission speed, as indicated by its name, is 9,600 bps. Background operation in this version also stays in the background where it belongs. The IT-Fax 9600 retains the intuitive menu structure of the original product, and its impressive list of extra features, if not enlarged noticeably, is still one of the fullest available

The JT-Fax 9600 board itself is a 2/3length card that plugs into any 8- or 16-bit slot. Memory address and interrupt settings reside on the card, but all other configurations and features are controlled by software. The configuration program is easy to use, which helps because to name a new calling group (a list of numbers to call in a batch), you'll have to run it again—a minor inconvenience.

STANDALONE OR RAM RESIDENT

You can run the JT-Fax 9600 software as a standalone program, a good idea if you don't send or receive many faxes. Why tie up any memory at all or have any slowdown in disk access or CPU speed? In most common operation, however, the JT-Fax 9600 software is run as a RAM-resident program that checks periodically for incoming faxes, which it will then automatically save. You can set it to print all incoming faxes that are received during the



JT-Fax 9600 Ouadram Limited Partnership I Quad Way Norcross, GA 30093 (800) 548-3420 List Price: \$795

Requires: 640K RAM (hard disk recommended); IBM PC, XT, AT, PS/2 Model 25 or 30, compatible; CGA, EGA, VGA, or Hercules graphics card; DOS 2.0 or later. In Short: The JT-Fax 9600 improves on the popular JT-Fax with an increased 9,600-bps maximum transmission speed and true background operation. Its software, which can run as a standalone program or a TSR, features an intuitive menu system and includes such extras as screen capture, printer capture, and calling group utilities.
CIRCLE 408 ON READER SERVICE CARD



"The Dataworld 288 [12 MHz] AT compatible... [is]... th6 fastest machine of the nine tasted in that review [July 1988]." (September 27, 1988). and

... speed and excellent compatibility... hundreds of dollars less expensive than other AT compatible.



NOW! 20MHz 286 SI = 22.5



"Marvelously cheap, powerful alternative ... outperformed the other 286's ..."

(October 11, 1988)



Portacomp II

80286 nunning at 8/12Mbc, 01 wait state Processis BIOS ond, (Award BIOS ond,) 512KB of RAM, expandable to 1MB on board Sockes for 80287-8. In Section 1MB on board Sockes for 80287-8. In Section 1MB on board 1MB on 1MB of 8028 of

DATA-286 20MHz 86 running at 10/20Mhz

0 .

80286 running at 10/20Mhz
AWARD B105 std.
1MB of RAM, esp. to 2MB on board
EMS 4.0 support for memory over 1MB
Socket for 80287
200W power supply
Real-time clock with battery backup
1.2MB floppy sids drive
1:1 interleave floppy/hard kic ontroller
1014cg/keyboard with "click"
Mono card w/parallel port (720x40348)
TLL monitor with till/swwteb base

\$1555

DATA-286 12MHz

80286 running at 8/12Mhz. 0/1 wait state Phoenix BIOS std. (Award BIOS opt.) 512KB of RAM, expandable to IMB on board Socket for 80287-8, -10 200W power supply

Real-time clock with battery backup 1:2MB floopy disk drive

1.2MB floppy disk drive Floppy/hard disk controller (1.1 interfeave controllers available) 101-key keyboard with "click" Nono card w/paraillel port (20x348) TTL monitor with titl/swivel base

\$1195

\$1975

COMPLETE 10MHz DESKTOP SYSTEMS FROM \$945.00



Vertical Case Front panel on/off switch 220W power supply 6 half-height drive bays

Dimensions: 16 3/4*(D) x 7 3/8*(W) x 25 5/8*(H) Available for 286-/386- models



DATA-386

4.77/6/8/16/MHz (20MHz opt.)
1MB of RAM, exp. to 10MB
Phoenix BIOS sid. (Award opt.)
220W power supply
1.2MB floppy disk drive
101-key keyboard with "click"
Five 16 and two 8-bit slots
Mono card and monitor \$\$1995\$



Portacomp I

80286 8/12MHz, 01 wait Phoenic BIOS std. (Award opt.) 512K RAM (exp. to 1MB) 200W power supply 12MB 5.25° floppy drive 20MB hard disk drive Supertwist backlit LCD RGB output port 5 expansion slots 1 parallel, 2 serial ports \$1875



Dataworld Keyboard

101-key enhanced layout L-shaped large return key Integrated dust cover (paper rest)



vey set for

Prices subject to change. No charge for credit card, check, C.O.D. 30 day moneyback guarantee (Shipping charges non-refundable). Dept. C

Dealer/overseas inquiries welcome

In-Calif. 1-800-722-7734 INFO: (213) 695-3777 Out-Calif. 1-800-722-7702 TECH: (213) 699-8250





With the \$795 JT-Fax 9600, Quadram has addressed the drawbacks of its original JT-Fax board: its limitation to 4,800-bps operation and a TSR feature that popped up in the middle of other applications when receiving or sending fases. The software that accompanies the ½-length card still retains the intuitive menu structure of the original product.

night, for example, so you don't have to wait to print them or view them on-screen the next morning.

While you are using other software with the JT-Fax 9600 software resident, other applications will slow down only while you are sending or receiving faxes. Unlike its slower, less expensive sibling, the JT-Fax 9600 does not make you stop all other operations while it receives or transmits.

AS EASY AS IT GETS You control all operations through simple menus. I've seen several people walk up to a computer with the JT-Fax software running and successfully send a fax from a stored file without having to look at the documentation or ask a question. You can't get much easier than that. New utility programs also let you transmit, print, and display faxes directly from the DOS command promot.

You can save fax numbers in a telephone directory and also assign them to one or more calling groups for mass transmission. You can also chain files for inclusion in a single fax. You can either transmit faxes immediately or schedule transmission for a later time. In addition, you can print a transaction log of transmitted and received faxes and failed attempts.

The JT-Fax's normal method of operation is to convert scanned input or disk files to fax format at the same time as transmis-

sion, although you can opt to preconvert files. While doing the latter slows down the transmission process, it also saves considerable disk storage space.

Besides standard fax operations, the JT-Fax 9600 has a screen-capture facility and a printer-capture feature that lets you fax text files formatted for an Epson FX-80 or compatible printer. You can insert signature, letterhead, or text files in faxes and can send and receive PC PaintBrush files directly. When you buy a JT-Fax 9600, you get a \$40 coupon for Inset Systems' \$99 program HiJaak, which includes a JT-Fax conversion utility to let you use graphics and other files from a wide variety of programs. This is just one of several programs coming from other vendors that aid the use of JT-Fax products with various application packages. Quadram's Asher Fax Division is aggressively working with other vendors to establish the JT-Fax line as an industry standard.

PEACEFUL COEXISTENCE JT-Fax boards work with all Group 3 fax machines, and Quadram reports that earlier problems with idiosyncratic fax machines have been cleared up. The Asher Fax Division also maintains a bulletin board from which registered users can download the latest copy of Tr-Fax software.

The JT-Fax boards support a wide variety of scanners and printers—among them

scanners from Brother, Princeton Graphics Systems, Hewlett-Packard, Canon, and Chinon; and printers from Brother, Epson, Genicom, IBM, and Hewlett-Packard. Our printed test samples looked very good, both in normal- and high-resolution modes. The board handled the oversized 28-inch test sample with ease, and the gray scale of the scanned image also looked pleasing.

If you don't need the extra speed and don't mind halting other computer applications when you send or receive a fax, the \$395 4,800-bps JT-Fax internal version (\$495 for the external version) may be all you need at less than half the price of the JT-Fax 9600. But if you need speed and want background operation, the JT-Fax 9600 is the one to look at.—Bruce Brown

RICOH CORP.

ImageCard

If anyone knows how to build a fax board, it ought to be Ricoh. As one of the leaders in fax machines, Ricoh has a wealth of experience to draw on. And, indeed, the \$1,175 ImageCard hardware is just as good (and as expensive) as you would expect.

The full-length ImageCard board sports a microprocessor to handle background operations and a proprietary chip that decompresses each line of a received fax, looks at the error code, and recompresses it before saving the data to disk. This results



5 Dedrick Pl. West Caldwell, NJ 07006 (201) 882-2000. List Price: \$1,175 (to change); ImageNet data communications software, \$395.

Coac communications on water 3979 are from the Requires 640K RAM, DOS 2.1 or later, in Short: The Recol ImageCard is designed in Short: The Recol ImageCard is designed as the Coache of the Coache of the Recol ImageCard is designed in Coache of the Recol ImageCard in Coache of the C

WE STAND BEHIND OUR LAN

NEXOS is the LAN system guaranteed to satisfy your vital business requirements. It's backed by DSC Communications Corporation, the worldwide supplier of telecommunications and networking equipment. NEXOS' advanced features plus DSC's unequaled commitment to customer service add up to complete LAN Satisfaction.

The NEXOS 386 protected mode implementation and integrated database engine deliver unmatched PC LAN performance. It's NetBIOS and TCP/IP compatible, runs all DOS-based applications and can be configured for Ethernet, Token-Ring and ARCnet.

NEXOS means reliable connections with a variety of host systems while ensuring data integrity and network

security. Powerful menus and on-line help make NEXOS easy to install and use.

We stand behind our LAN with high quality, single-source products and services. There's no substitute for factory integration, on-site service and expert technical support on demand.

When you're ready for a LAN vendor whose number one priority is customer satisfaction, you're in the market for DSC. Call now and we'll prove it with a 30 day evaluation of our

NEXOS Operating System, and a free 30 day subscription to our LAN Support Program; offer expires Nov. 17, 1989. For information, or to request an evaluation call (800) BUY-NEXOS



Call	or wr	ite for a	additional	informati	on: DSC	Commu	inications	Corporation,
0.0	Box	110940	, Campbel	1, CA 95	011. (80	00) BUY	NEXOS.	

Vame	Title

Company_

_____Add

City _____State _____Z

dsc	DSC Communication
946	Corporation

___Phone .

Fax Boards: Compatibility Chart

Because a communications standard can turn out to be less standardized than you might expect, PC Labs tested the compatibility of PC fax boards that are touted as adhering to the Group 3 standard. Using two fax machines, we tried sending a twopage message from each board reviewed to each of the other boards. We also tested each fax board for compatibility with two of the more-commonly-used standalone fax machines, the Canon FaxPhone 20 and the Ricoh FAX60. The sending systems are listed along the top of this chart; the receiving systems are listed

down the side.

For the purposes of this test, we accepted as a "pase" any transmission that succeeded in transferring both pages within cases where two puckages could not establish communications to cases where the packages could transmit the first page but lost the second. Most disconanting were those failures that were recorded successed. Most disconanting were those failures that were recorded successed. Most disconanting were those failures that were recorded successed—without any file being produced on the receiving side.

The compatibility tests showed.

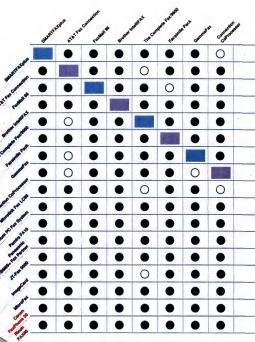
The compatibility tests showed expected anomalies. Some pairs of packages (such as the imageCard and The Complete Faz/960) won't talk to each other at all. Others (such as the JT-Fax 9600 and The Complete Faz/960) will transmit data only in one direction.

The point of this exercise is not only to demonstrate the compatibility of each board with the others, but to show how much variation there is in the manufacturers' interpretations of the Group 3 standard. This is true for fax

machines as well as fax boards.
As these compatibility lests
show, the fax industry has yet to
hammer out the details of the
Group 3 standard. This is partly
owing to the relative newness of
the standard; moreover, there is
no one dominant manufacture
the rest of the industry can
follow. As a result, you
cannot be absolutely sure that

any given fax package can talk to any other—be it a PC-based system or a standalone machine.

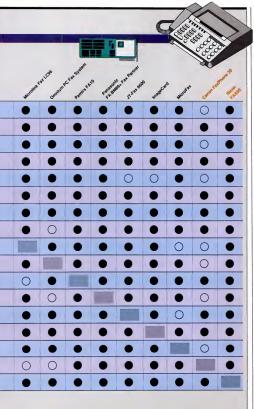
SENDING



—Yes

O-No

-Not applicable: the product was not tested for compatibility with itself.



in more detailed—and more accurate—error reporting than is the case with most fax boards. Ricoh also boats that the package has been tested with more than 100 machines and is compatible with them all.

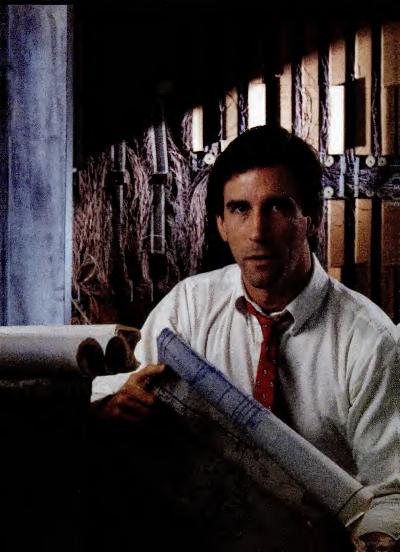
The ImageCard was designed as a broadcasting tool for high-volume fax users. A remote-control feature will let you send a file to the ImageCard from a fax machine, then use the ImageCard to distribute the fax to other locations.

A related feature is the \$395 ImageNet option. With ImageNet running on the PC with ImageCard and on a remote PC, you

A remote-control feature will let you send a fax to your computer, then use the ImageCard to distribute the fax to other locations.

can call the ImageCard from the remote location and send it a fax through a standard modem. (The modem is not included in the fax package.) The ImageCard can then resend the fax. In short, ImageNet gives fax capabilities to the remote PC without needing a fax board. (The ImageNet software and remote operations feature were not tested for this review.)

IMPROVEMENTS ON THE WAY
The broadcast features in the ImageCard package stem from Ricoh's background as a fax machine manufacturer. Alas, Ricoh's background shows elsewhere as well. In particular, the software was designed with little thought for the PC market, resulting in a limited and often clumsy package. On the plus side, an improved version of the software and documentation is in the works. Because the software is in beta test, this review is necessarily based on the older, 1.22 release. However, Ricoh also sup-





Now you can install your network using existing phone wire, and set Ethernet performance, too.

Introducing the total solution for Ethernet network performance without the cost of cumbersome cabling. Western Digital's Preference™ family of network products makes it easier and more economical than ever to create new networks and expand existing coaxial Ethernet systems, too -using wire that's already in the wall.

A Preference for Existing Cabling.

The surprise expense in PC networking has been cabling installation. Coaxial connections not only cost a bundle initially, there are hidden costs in network maintenance and expansion.

Now you can add a network node at any time, wherever there's a phone jack, Our EtherCard PLUS TP™ LAN adapter takes advantage of unused twisted pairs of wires in your phone system, without

any disruption of voice communication. Nothing could be easier or more flexible.

A Preference for Complete Solutions.

Western Digital's Ethernet

Twisted Pair products provide you a complete solution.

You can connect up to eight PCs to each WD™ LattisNet Concentrator in your network. The concentrators themselves can be interconnected via Thin Ethernet for easy expandability, or tie directly into an existing Ethernet network.

Mix conventional Ethernet adapters and our twisted pair adapters in the same network using the WD LattisNet Transceiver. That way you don't have to replace existing hardware when you expand with our twisted pair solutions.

So avoid the high cost of network wiring. Call your network dealer. And express your Preference. When you're in touch with technology, you're in touch with Western Digital.



Preference and EtherCard PLUS TP and WD are trademarks of Western Digital Corporation. Other marks noted herein belong to other companies. CIRCLE 239 ON READER SERVICE CARD



The Juli-Ingth 9,600-bps board that is part of the \$1,175 Ricoh ImageCard package sports a microprocessor to handle background operations and a proprietary chip that decompresses each line of a received fax, looks at the error code, and recompresses ib before saving the data to disk. This results in more detailed—and more accurate—error reporting than with most fax boards.

plied a beta release of Version 2.03.

In both versions, the master menu offers three choices for fax transmission. The Telephone Network choice includes options to send a fax, receive a fax, and display an image. Unfortunately, the software module is modeled too closely on a fax machine. For example, if a transmission fails, you have to start over again, reentering the file to send and the phone number to send to.

The Ricoh ImageCard is by far the most expensive fax package reviewed here.

Some limitations are handled in the main menu's Document Distribution choice. This module contains a phone book for individuals and groups, with up to 200 numbers per group. It will also let you schedule faxes and will automatically retry when a transmission fails. Oddly, for a package that concentrates on broadcast functions, it is limited to about 250 scheduled transmissions, with a transmission

defined as one image file going to one phone number.

The third choice on the main menu lets you automatically negotiate connections with a data network—be it Tymnet or a dedicated private data line—so you can send faxes over that network

The documentation gets good marks for orparaziation but its written in a jargon-laden technostyle that will never use one word where five will do. Worse, it is printed in landscape orientation, so that reading the manual is clumsier than it has to be. According to a Ricoh spokesman, the manual for Version 2.03 will be completely rewritten and will be printed in portrait orientation.

Missing from this package is any direct support for scanners. Version 2.03 will include scanner support, but only for the Ricoh IS10, IS30, SS30, RS320, and compatibles—and even then without a dithering feature. Printer support is similarly weak, with choices for only the Xerox 4045, HP LaserIet Plus, IBM, Epson, Okidata 9293, and AST Turbo printers.

Finally, the Ricoh ImageCard is by far the most expensive fax package reviewed here. At \$1,175, it costs almost 20 percent more than the next most expensive package. According to a Ricoh spokesman, the price will drop significantly with Version 2.03; but the new price has not been determined as of this writing. Regardless of price, the ImageCard is of little interest to those who simply want to add a fax capability to their PCs. But for those who can make use of the broadcasting capability, the data network feature, or both, the Ricoh ImageCard is an interesting possibility.—M. David Stone

XEROX IMAGING SYSTEMS/DATACOPY MicroFax

When we last reviewed the MicroFax, its manufacturer was an independent. Now it's the Datacopy products group of Xerox Imaging Systems. Fortunately for the MicroFax, this new business arrangement didn't result in the product's getting lost in the bureaucracy of a large organization: Version 2.0 of the \$695 system brings new and enhanced features to an already strong product.

The MicroFax is a full-sized 9,600-bitper-second fax board with an on-board 1,200-bps Hayes-compatible modern. It should be noted, however, that no modern communications software is included, so you'll need to supply your own. All standard fax operations are controlled with the MicroFax software.

The MicroFax's upgrade path, which is taken care of through software, reflects the product's maturity. As the vendor adds new features, all you'll need to do is get a new disk; because you won't have to re-



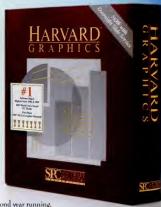
FACT FILE

Xerox Imaging Systems/Daucopy 1215 Term Bella Ave. Mountain View, CA 94043 (415) 965-790. List Price: 5905 Requires: 121 K RAM: hard disk: IBM PC, XT, AT, any PS/2 or compatible; CGA, EGA, VGA, Hercules, or many other graph sceads for viewing, DOS 2:0 or later. In Short: Easy to install and use, the Danton of the Company Microfica is a burgain with its on-board

In Short: Easy to install and use, the Datacopy MicroPax is a bragin with its on-board 1,200-bps modern and full set of features. Its only limitation is its inability to handle grayscale transmissions, except through an approximation technique called dithering. DIRCLE 410CN MEADER SERVICE CAND.

A Few Words From The World's Most Celebrated Graphics Software.





Thank you. For those of you who haven't heard, Harvard Graphics from Software Publishing has gotten a lot of recognition from the trade press. Why, you may ask? Certainly our crisp, high-speed output helped influence InfoWorld readers to name us Product of the Year. And the easy access to so many chart and graphing options must have helped PC World's audience give us their World Class Award for



the second year running.

Actually it must have been all those things and more. Otherwise why would PC Magazine call Harvard Graphics "the de facto standard" software for business graphics?

Of course, the experts aren't the only ones who favor Harvard Graphics. In fact, with its growing popularity, Harvard Graphics has become the number-one selling business graphics software.

And naturally we'd like to invite those of you who haven't tried Harvard Graphics to call us for a free trial disk at the toll-free number below.

In a matter of minutes, it'll give you a vivid demonstration of the qualities that make us the graphics superpower.

FREE TRIAL DISK, CALL 1-800-345-2888, OPERATOR 53. FOR UPGRADE LITERATURE CALL 1-303-799-4900.



Although you'll have to supply your own communications software, the full-length 9,600bps board that is part of the \$695 MicroF ax system from the Datacopy products group of Xerox Imaging Systems has a built-in 1,200-bps Hayes-compatible modem.

place the board, you'll save money and time.

A new version of the software, which should be available by this time, will automate installation. Even so, installing the current version is a snap, merely requiring you to answer a series of simple on-screen questions.

MEMORY-SAVING SOFTWARE MicroFax software isn't a TSR, but it can send and receive in the background. The resident program requires only a frugal 4K of memory—a nice switch from some memory-hungry TSRs. The background feature worked reasonably well in our error-handling tests, continuing to receive a file when asked to log on to an empty drive.

If the computer was already trying to read an empty drive or pausing a screen, however, an incoming fax call would not connect. A call coming in while the computer was printing out a file caused no problems for the MicroFax. The program does not protest against a warm reboot, though, which means that an incoming fax will be terminated if the Cirl-Alt-Del keystroke combination is used during a transmission. In all cases we were sending faxes from one MicroFax to another, and the sending program rescheduled unsuccessful connections or incomplete transmissions for a later time.

The MicroFax user interface is menu driven and simple. The program is divided

into three basic sections: Commands, Logs and Files, and Set Up. You select any one of these sections from a horizontal-bar menu. After you've made a selection, a pull-down menu appears with more specific subcommands or program functions. All operations are accessed through menus; the software does not offer hot-keys.

BEVOND THE BASICS Besides standard fax operations, the MicroFax gives you several extra capabilities. You can capture both text and graphics screens for either immediate or later transmission, and you can also transmit originals directly from a scanner and from ASCII and graphics files. MicroFax works with .PCX, GEM, TIFF, .IMG, and AutoCAD graphics files But you'll have to work with those files as they are, since there are no built-in graphics editing capabilities. Both ASCII and graphics files are converted to fax format prior to transmission, with the conversion process done in the foreground.

The MicroFax also lets you set up phone books and schedule calls for later transmission. The software maintains logs of all transactions, which can be printed as well as displayed. Although the MicroFax software does not offer the ability to handle gray scales (except by dithering), it does let you select between normal- and high-resolution modes and normal and compressed fonts.

There's no automatic cover-page fea-

ture, but there is a way for you to include a document header with your transmission. For manual calling, you can switch between voice and fax transmission modes both before and after sending a fax. Furthermore, the MicroFax supports Group 3 polling and turnaround polling.

The MicroFax works with all standalone fax machines, except for one obscure Fujitsu machine, according to the vendor. We had no problems working with two fax machines at PC Labs. In our performance tests, we used the MicroFax with the Datacopy 730GS scanner: it can be set to work with all other Datacopy scanners as well as the IBM 3117, HP Scanlet. AT&T Overview. Canon IX-12. Microtek MS-300A, Panasonic FX-RS505, Princeton LS300A, Shape's ShapeScan SS-240, Tall Tree Systems' Jlaser scanner, and all Ricoh scanners. The MicroFax has drivers for most printers, including those that work with the PostScript page description language. Sample output produced on our HP LaserJet Plus looked fine, with no aspect ratio distortion. The

The MicroFax's
upgrade path is taken
care of through
software. As the vendor
adds new
features, all you'll need
is a new disk.

MicroFax board can also transmit oversized sheets of paper, handling our 28-inch test sample without a hitch. (However, since the accompanying software can't handle gray scales, the transmitted photo was reproduced in black and white.)

Considering that other fax boards with similar features that include a modern typically cost a couple of hundred dollars more, the Datacopy MicroFax is a good buy for most users. It can't handle gray



The Ones To Ask For

Curtis Electronic Surge Protectors are built to provide surge protection for any microcomputer for a lifetime. Constructed with precision, using advanced semiconductor technology, the Curtis Jewels prevent damage to microcomputer systems and data from powerline overvoltage



"surges, spikes and glitches." Surge protection from the Curlts Jewels is your guarantee of the best line of defense for your valuable hardware and data, at a price that won't shock you. Get your computer the protection it deserves with Curlis — the experts in accessories.

Curtis products are available nationally from leading Dealers, Distributors, and Retail Chains. In Canada: Personal Computer Assoc. Inc., P.O. Box 235, Ajax, ONT, L1S 3C3, (416) 427-6612

For the Curtis dealer nearest you call (603) 532-4123 Ext. 871



CURTIS

30 Fitzgerald Drive, Jaffrey, NH 03452
A subsidiary of Rolodex Corporation



We have one thing to say to the people who keep getting personal about PROCOMM PLUS

"Right now, PROCOMM PLUS is the definitive telecom program and the one I personally use and recommend."

John C. Dvorak, columnist, PC Magazine

People who review software have a very lough job. They see hundreds of new programs every week. But the ones who have seen the new PROCOMM PLUS communications software are doing more than writing rove reviews about it. They rig eiting personal. They're using it at work and at home.

Morphe it's because PROCOMM PLUS is so easy to use it's "intuitive" Or perhaps it's because PROCOMM PLUS has an extremely powerful script command language, contrekt sensitive help, 16 terminal emulations with keyboard re-mapping, 12 file transfer protocols, a fully-automated dialing directory, and advanced host mode with electronic mail.

But one thing is for certain. If PROCOMM PLUS is the personal choice of the people who review software, you can be sure that PROCOMM PLUS is right for you.

It's time you got personal about PROCOMM PLUS. Ask for PROCOMM PLUS at a dealer near you. Or, call 314-474-8461.

Thank You.



■ FAX SYSTEMS



- Connection CoProcessor
- . JT-Fax 9600

In PC Magazine's last roundup of PC-compatible fax systems, we singled out several products—Quadram's JT-Fax, GammaLink's Gamal'ax, Datacopy's Microf'ax, and Panasonic's Fax Partner—for honrable mention, but we didn't award any one board an Editor's Choice for a simple reason: not one of the packages was a fully finished product. That situation, we're happy to report, has changed, and there are now several packages that we can wholeheartedly recommend.

If you want a package that maintains the ease of use of a fax machine while taking advantage of the capabilities of a PC, you have at least two good choices. The \$995 Intel PCEO Connection CoProcessor offers an easy-to-use menu structure. free technical support, excellent error handling, and a 5-year replacement warranty. Missing from the package is the ability to capture printer output from an application to send as a fax. However, the Connection CoProcessor is the first piece of hardware to support CAS, and if the industry adopts it, the board will be able to send faxes from any program with a built-in CAS interface.

Quadram's JT-Fax 9600 is another good choice. It sports a simple menu structure, somewhat betterthan-average speeds on PC Labs' timing tests, and a price of \$795. Most important, this version remedies two drawbacks that kept the original JT-Fax from earning an Editor's Choice designation: il limitation to 4,800-bps operation, and a TSR feature that popped up in the middle of other applications when you sent or received faxes.

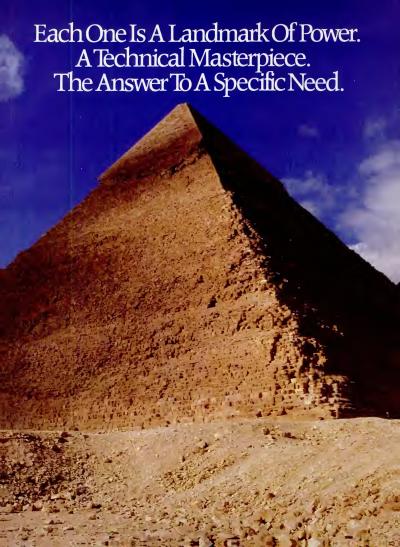
An honorable mention goes to The Complete Fay9600, from The Complete Fay9600, from The Gomplete Pc. The \$699 package has almost as well designed a menu structure as the Connection Co-Processor and adds the ability to send faxes by capturing printer output. Unfortunately, its speed is on the low side of average, but it is a solid product, well worth your attention

An additional honorable mention goes to the AT&T Fax Connection, which was the fastest performer on two of the three PC Labs benchmark tests. As tested, the \$995 board takes its marching orders only from the DOS command line, a method that may be intimidating to novices. Of course, for an additional \$295 (or an extra \$200, if purchased with the board), you can buy PagePower, an integrated set of fax, scan, draw, and communications programs that runs under Microsoft Windows and makes the system more user friendly. But that extra cost brings the price of the Fax Connection well into the range of fax machines, which is something you should consider before you take the plunee.

scales and its modem can't exceed the speed of 1,200 bps, but the MicroFax's fine background operation and easy menu operation make it a good choice for general use.—Bruce Brown

John Britton is a writer and computer con- | contributing editors of PC Magazine.

sultant living in New York. Bruce Brown is a frequent contributor to PC Magazine. Robert Kendall is a New Jersey-based free-lance writer and editor who specialties in computers. Edward Mendelson, Robin Raskin, and M. David Stone are contribute a dition of PC Magazine.



AST makes the fastest and highest-quality desktop computers in the business world. One of them is right for you. Whether you need a personal computer for general office work, engineering, desktop

publishing, financial analysis or running your business at home, you can count on AST to fit your desktop size, your budget and your need for ultimate speed.

Our Newest Wonders. If you want extra performance and high quality without spending a lot of money, try our newest computers - the AST Premium® 386/16 and the AST Bravo/286. Our cache-based AST Premium 386/16 makes 386 - CPU computing available to even the most cost-conscious budget. And the AST Bravo/286 is all the AT compatible power you

need to manage your small business or home office, or use it as a node in a local area network.

Our Most Powerful Wonders. For high-speed CAD/CAM/CAE, multitasking, multiuser environments and LAN file service, choose AST's top performing systems. The 25 MHz AST Premium 386/25 and 20 MHz AST Premium/386C bring the highest performance to your sophisticated 386-CPU based applications.

Our Most Versatile Wonder. If you have to choose one computer that satisfies

the broadest range of needs, let it be the AST Premium/286. Perfect for flying through word processing, large spreadsheets and even technical applications, it's the industry's award-winner for 286 performance and value.



Our Smallest Wonders. When your desktop space

AST, AST logo and AST Premium registered trademarks AST Research, Inc. 80386 and 80386SX trademarks Intel Corp AST markets products worldwide - in Europe and the Middle East call 44 1 568 4350: in Japan



is limited, but your appetite for speed and power isn't, the AST Premium Workstation/386SX and the AST Premium Workstation/286 offer test-proven compatibility you can rely on. These sleek, small-sized wonders are the quality answer to cost-effective high-

performance desktop computing [PCAWARUS]
AST Service, Support And Reliability — The
Eighth Wonder. The AST logo means quality products and service. In fact, PC Week recently named
AST first in technical support, over Compag*
and IBM*

For the products and service that will make you the next wonder of the world, ask for AST Computers. For more information, call (714) 863-0181 and ask for operator BB8, use our Bulletin Board Service number (714) 852-1872, or fill out the coupon.

All other product and brand names are trademarks and registered trademarks of their respective companie 81 3 818 0710; in the Ear East call our Hong Kong office 852 5 806 4333; in Canada call 416 826-7514.

☐ Please send me information on AST computers
☐ I am ☐ an end user ☐ a reseller.
Name
☐ Title
☐ Company
Address
☐ City State/Zip
☐ Phone



AST Research, Inc. 2121 Alton, Irvine, CA 92714-4992. Attn: M.C.

Times Have Changed.

he Seven Wonders iness World.



UNICONO.

AST Premium
Workstation/386SX
Executive styling
in a cost-effective,
entry-level 386CPU system.



For all practical purposes.

Hyundai's PC-compatibles aren't flashy, just functional. And are designed to give practical people like yourself one of the best values in computers today.

For the price you might pay for some compatibles, you can actually afford two Hyundais. One for the office, one for the home.

And Hyundai offers you a full range of practical solutions. From our 8/10 MHz XT-compatible, the Super-16TE; to our small footprint AT-compatible. the Super-286c; to our diskless PC Terminal; and our "plug and play" LAN package—the simple answer to your networking needs. And they all come with an 18 month warranty.* You'll probably never need it but it's nice insurance to have.

Of course, you could spend more on a fancier computer. But why? When for all practical purposes, you can own a Hyundai.

For the Hyundai dealer nearest you, call 1-800-727-6972 ext. 119.



Practical Compatibles.

DOS-under-Unix software offers PC users a way to merge the strengths of two operating systems, affording them more power and flexibility than either system could offer independently. Of CONVENIENCE

DOS UNDER UNIX

If one operating system has profited from the confusion that OS/2's arrival has introduced in the PC market, it's Unix. For as PC users take a hard look at whether OS/2 is the answer to dealing with such thorny problems as multitasking, they are also remembering that Unix has offered that advanced capability and a whole lot more on mainframes and minicomputers since the early 1970s. And now that the advent of cheap 80386 32-bit processing power makes the PC a legitimate hardware platform for Unix (and also one that is similar to the minicomputers on which Unix was developed), Unix has become a viable, attractive option for people who are thinking about upgrading from DOS to a different and more powerful operating system.

VIRTUAL 8086 MODE: THE KEY TO RUNNING MULTIPLE DOS SESSIONS ON A 386 MACHINE

Virtual 8086 mode—a mapped, protected operating mode of the 80386 chip—allows a host 80386 machine to imitate an ordinary PC nimbly and convincingly.

Despite its faults, the 8086 chip has proven to be the most successful platform for business applications. That's why, when Intel designed successor products, it made sure to provide for strict backward compatibility with the family patriarch.

When power is applied and an 80286 or 80386 machine comes to life, it starts out in the guise of a humble 8086; thus it is an acceptable hardware platform for ordinary 8086 applications. In this instance, the 286 or 386 runs in real mode, but both microprocessors can support protected modes as well. Protected mode facilitates running several tasks concurrently because it permits isolating each task. Although the 286 has a protected mode of operation, it retains the 8086's 16-bit architecture. The 386 removes the 16-bit limitation in protected mode, and it also has virtual 8086 mode, which is used by DOS-under-Unix software.

When you run a 286 in protected mode, you can utilize up to 16MB of memory (instead of the 1MB potentially addressed by the 8086), and you get memory management, which allows the

operating system to institute security measures. Unfortunately, there is no simple route that an advanced operating system like OS/2 or Unix can take back to 8086 real mode. OS/2 is able to switch between 286 protected mode and 8086 real mode. But to do so, OS/2 must go through the motions of restarting your machine, which means that you are limited to one real-mode process at a time.

When a 386 shifts into protected mode, the potential memory you can address goes up to 4 gigabytes. The internal architecture of the CPU goes to 32 bits (which makes it easier to work with large programs and large data sets), and you also get memory management and virtual 8006 mode.

A mapped protected mode of the 386 processor, virtual 8086 mode is essentially an illusion. It makes use of some of the attributes of both real and protected modes, allowing your DOS-under-Unix program to set up a PC-like environment from within protected mode. An application that runs in this environment will think it is running in an ordinary 8086-based PC; little does it know that a pow-

erful 386 is pulling the strings to make everything work. For example, many DOS programs routinely write characters to the display screen addresses of the PC. When these programs run in virtual 8086 mode, they still write to those addresses, but the addresses no longer refer to the screen. It's up to the 386 to decide if and when that information should be displayed on the screen of the computer.

Using virtual 8086 instead of real mode gives you much more flexibility. If a 386 machine has 6MB of memory, for example, it can take the top half of that memory and set up three independent virtual 8086 environments of 1MB each. in which different DOS sessions can be run. Each environment is isolated, so that an ill-behaved application in one can't corrupt the others. Of course, from Unix's perspective, each of these three environments is simply a task that should be allocated time slices, just like all the other active tasks in the system. In addition, virtual 8086 environments can be swapped out to disk so that you can run more than will simultaneously fit in memory. This is why the Unix system,

Of course, people who have worked in organizations where DOS and Unix have been coexisting on different hardware platforms have known all this for some time now. What they might not know is that the 386 chip, through its virtual 8086 mode, offers them a way to bring the power of DOS applications to the Unix world while at the same time bringing much of the power of Unix to the DOS world, without sacrificing most of the amenities exclusive to each

The virtual 8086 mode makes it possible to multitask multiple DOS sessions under Unix on a single 386 machine. In this arrangement, each DOS application runs in its own virtual machine. In its ability to handle multiple DOS sessions as well as multiple buers, Unix goes OS/2 one better: OS/2, a single-user, multitasking operating system, does not support the virtual 8086 mode of the 386 microprocessor. OS/2 can therefore run DOS software in its compatibility box, but only one session at a time. (See the sidebar "Virtual 8086 Mode: The Keyto Running Multiple DOS Sessions on a 386 Machine.")

Several software products, known as

DOS-under-Unix environments, make use of the 386's virtual 8086 mode to couple DOS and Unix. Reviewed here are two of these products. The first is VP/ix, a collaborative venture of Interactive Systems Corp., a long-time Unix vendor, and Phoenix Technologies, known for its BIOS compatibility software; the second is Merge 386 from Locus Computing Corp., a company known for its DOS-to-Unix bridge products (in particular, PC-Interface, a DOS-to-Unix networking product). Both VP/ix and Merge 386 were first re-leased in 1987 and have undersone one

which uses virtual 8086 mode for DOS applications, can run several concurrently, while OS/2, which uses 8086 real mode to run DOS software, can handle only one DOS task at a time.

VP/ix and Merge 386 set up a virtual 8086 environment that duplicates the hardware/software environment of an ordinary PC, as far as possible, with the effect that DOS and most DOS applications are fooled. For example, the screen buffer and the BIOS software must be where they are expected, the BIOS level interrupts and services must work as expected, and the communication ports must function correctly. The environment must be convincing enough that DOS can load and operate normally, because VP/ix and Merge 386 actually run DOS; they don't simulate it.

As it stands, both products fall short of precisely imitating every aspect of the PC's hardware, and both have problems handling software that is ultrasensitive to timing. As a result, they won't be able to run every DOS application under the sun-just the vast majority.

-Kaare Christian

major revision each. Although the two products are more alike today than they were when they were first released, VP/ix is directed toward users who require convenient DOS-under-Unix capability, while Merge 386 is targeted toward users whose systems are burdened with heavy multiuser loads where performance and configurability are important.

SECONDARY VENDORS Both VP/ix and Merge 386 are available from many secondary vendors, some of whom add related features that enhance these DOS-



1,200 FAXES Out by Noon... With FaxCast, No Sweat

FAX communications are fast, reliable, easy-to-use and relatively inexpensive. But, sending a document to tens, hundreds or thousands of FAX machines is tedious-requiring hours of manual input on most FAX machines. Even the best FAX equipment can't meet this challenge.

FaxCast - Fast, Reliable, Low Cost

Now you can broadcast to multiple FAX addresses using an IBM compatible PC and Xpedite FaxCast™ service. You simply send your FAX address list and your message through FaxCast service. Your message is electronically merged with your addresses and automatically delivered. FaxCast service offers a variety of options including the use of your letterhead and the ability to send graphics. You can specify when your broadcast will begin or have delivery done overnight-when one page documents can be delivered for less than 25-cents.*

Convenience & Higher Quality

You'll try Xpedite FaxCast for convenience and low delivery prices; but, you'll stay for quality and reliability. Documents delivered through FaxCast are clearer than documents sent from FAX machines - and Xpedite FaxCast is the reliable means of broadcasting FAX communications.

To find out how Xpedite FaxCast will help you, give us a call.

call today 1-800-227-9379 IN N.J. CALL 201-389-3373



Xpedite Systems, inc.

446 Highway 35 Eatontown, NJ 07724

Delivery charges based upon output time and vary by document length and density

SPF/PC°

Bridging the Micro-to-Mainframe Editing Gap

Now you can re-create the mainframe editing environment on your own PC with SPF/PC, the only PC editor functionally equivalent to editing with ISPF/PDF Version 2. Release 2 on MVS.

Files of virtually any size may be edited with SPF/PC because it uses all extended or expanded memory, or disk drive work space.

Mainframe users will especially appreciate SPF/PC's familiar commands, fast PC processing and micro-to-mainframe file portability. SPF/PC also offers:

- · True split screen
- · Directory/member lists
- Command stacking
- · Binary file editing
- Hexadecimal editing
- · Network support

Want proof? Ask for a free, interactive demonstration diskette.



SPF/PC® — so much like the real thing, you'll forget you're editing on a PC.

CTC'
Command Technology
Corporation

1900 Mountain Blvd., Oakland, CA 94611 Phone: (415) 339-3530 FAX: (415) 339-3883 Orders only: (800) 336-3320 (Canada, U.S.)

DOS UNDER UNIX

under-Unix environments. Some offer DOS-under-Unix products designed for specific hardware platforms. Others offer related networking products, the capability to mount DOS file systems onto the Unix file system, and compatibility with the emerging X Window environment—a graphical user interface developed at Massachusetts Institute of Technology that adds windows and graphics extensions to the Unix operating system.

Because of the similarities between VP/ix and Merge 386 and their variants, we decided to test the primary products in just one Unix environment: VP/ix was tested under Interactive Systems' own Unix environment, 386/ix; Merge 386 was tested under Bell Technologies' Unix System V. Release 3.0. The testing and evaluation focused on the DOS-under-Unix products, not on the host Unix environment, although the performance of the host Unix software does have an important impact on file I/O operations. The performance of computationally intensive operations, which are more internal to the virtual 8086 environment, is determined by VP/ix and Merge 386.

Of all the vendors that have enhanced VP/ix, Sun Microsystems has probably done the most customization. Sun Microsystems made extensive changes to VP/ix so that it can work smoothly with DOS Windows, a windowing environment that is bundled with the Sun 386i computer. (For this reason, the review of VP/ix in this issue has only limited applicability to those considering the Sun product.) Sun Microsystems' version of VP/ix, which comes with both the Sun 386i/150 and Sun 386i/250, allows DOS text or graphics applications to run in windows on either machine's large, high-resolution screen; allows cutting and pasting of data between windows: comes with Sun Organizer, an icon-based interface to both Unix and DOS software and files; lets you dynamically attach and detach nonshareable devices, such as floppy disk drives and communications ports; lets you run selected DOS networking products in the DOS environment; includes a Microsoft Windows 2.01 driver so that Windows can use the full screen; and allows for per-drive file sharing and per-drive file and record lock-

the Sun 386i/150 and 386i/250 are \$8,490 and \$12,740, respectively.

AT&T, whose Bell Laboratories developed Unix in the early 1970s, has a version of VPix Called AT&T Simul-Task 386, Version 2.0, which runs under Unix System V.386, Release 3.2, primarily on AT&T's WorkGroup System (WGS) 6386 and WGS 6386E. Among its enhancements are its ability to run DOS CGA (Color/Graphics Adapter) and text applications in console X11 Windows (X11 Windows is the latest release of the X Window environment) and DOS EGA (Enhanced Graphics Adapter) applications

■ The 386, through its virtual 8086 mode, offers a way to bring the power of DOS to the Unix environment.

in full-screen X11 Windows. In addition, its base Unix menuing environment simplifies DOS access. Simul-Task 386, Version 2.0, costs \$695 for an unlimited license, and Unix System V/386, Release 3.2, costs \$795 for an unlimited license.

The Santa Cruz Operation, which makes SCO Xenix, one of the most popular Unix variants, offers SCO VP/ix running under SCO Xenix 386 (Versions 2.2) and 2.3). Its enhancements include commands that let you access files on DOS floppy disks and partitions; support for SunRiver's graphics terminal, the PS/2 series of computers, and the PS/2 mouse; menu-driven system administration: the ability to run DOS software in the X Window environment; and the ability to integrate standalone DOS machines and Xenix hosts through Xenix-Net. SCO VP/ix has a price of \$495 for a one- to two-user license and \$995 for an unlimited license: SCO Xenix 386 costs \$595 for a one- to twouser license and \$795 for an unlimited li-

sharing and per-drive file and record locking over the network. The base prices of share of enhancements. For example,



QNX°: Bend it, shape it, any way you want it.

ARCHITECTURE If the micro world were not so varied, QNX would not be so successful. After all, it is the operating system which enhances or limits the potential capabilities of applications. QNX owes its success (over 75,000 systems sold since 1982) to the tremendous power and flexibility provided by its modular architecture

Based on message-passing, QNX is radically more innovative than UNIX or OS/2. Written by a small team of dedicated designers, it provides a fully integrated multi-user, multi-tasking, networked operating system in a lean 148K. By comparison. both OS/2 and UNIX, written by many hands, are huge and cumbersome. Both are examples of a monolithic operating system design fashionable over 20 years ago.

MULTI-USER OS/2 is multi-tasking but NOT multi-user. For OS/2, this inherent deficiency is a serious handicap for terminal and remote access. QNX is both multi-tasking AND multi-user, allowing up to 32 terminals and modems to connect to any computer.

INTEGRATED NETWORKING Neither UNIX nor OS/2 can provide integrated networking. With truly distributed processing and resource sharing, QNX makes all resources (processors, disks, printers and modems anywhere on the network) available to any user. Systems may be single computers, or, by simply adding micros without changes to user software, they can grow to large transparent multi-

PC's, AT's and PS/2's OS/2 and UNIX severely restrict hardware that can be used: you must replace all your PC's with AT's. In contrast, QNX runs superbly on PC's and literally soars on AT's and PS/2's. You can

processor environments. QNX is the main-

frame you build micro by micro.

run your unmodified QNX applications on any mix of machines, either standalone or in a QNX local area network, in real mode on PC's or in protected mode on AT's. Only QNX lets you run multi-user/multitasking with networking on all classes of machines.

REAL TIME QNX real-time performance leaves both OS/2 and UNIX wallowing at the gate. In fact, QNX is in use at thousands of real-time sites, right now.

DOS SUPPORT QNX allows you to run. one PC-DOS application at each computer on a QNX network. With OS/2, 128K of the DOS memory is consumed to enable this facility. Within QNX protected mode, a full 640K can be used for PC-DOS.

ANY WAY YOU WANT IT QNX has the power and flexibility you need. Call for details and a demo disk.

THE ONLY MULTI-USER, MULTI-TASKING, NETWORKING, REAL-TIME OPERATING SYSTEM FOR THE IBM PC. AT. PS/2. THE HP VECTRA, AND COMPATIBLES.

Multi-Liser 10 (32) serial terminals per PC (AT). Multi-Tasking 64 (150) tasks per PC (AT). 2.5 Megabit token passing. 255 PC's and/or AT's per network 10,000 tasks per network. Thousands of users per network. Networking

Real Time

4.250 task switches/sec (AT). Fast intertask communication between tasks on any machine

PC-DOS

C Compiler Standard Kernighan and Ritchie. Single PC, networked PC's, single PC with terminals, networked PC's with terminals

No central servers. Full sharing of disks, devices and CPU's. PC-DOS runs as a QNX task From US \$450. Runtime pricing available

For further information or a free of

diskette, please telephone (613) 591-0931.

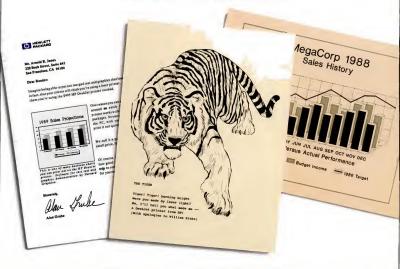
Quantum Software Systems Ltd. • Kanata South Business Park • 175 Terrence Matthews Crescent • Kanata, Ontario, Canada • K2M 1W8 CIRCLE 192 ON READER SERVICE CARD Come meet with us! COMOEX/Spring '89, April 10-13 • McCormick Place • Chicago, IL • Booth #2843

We keep telling people this is <u>not</u> a laser printer.



The \$995 HP DeskJet Printer.

But they keep looking at the evidence.



You may not believe your eyes, either. The HP DeskJet printer gives you the same crisp, black lettering. And clean, sharp graphics. But it uses advanced inkbut the same discrete technology to give you these laser-like qualities for the price of a 24-wire printer.

For just \$995, you get 300 dpi in a trim 15-pound package that sits easily on your desk. It has four built-in fonts, and over 100 optional fonts available in plug-in cartridges. With a 20,000-hour MTBF, it will keep working away for a long, long time. And it will do it all in blissful quiet. So don't settle for a noisy dot matrix printer. Instead, call 1-800-752-0900, Ext. 296J for a brochure and your nearest authorized HP dealer. Then judge the HP DeskJet printer for yourself.



■ DOS LINDER LINIX

Prime Computer offers Merge 386 under its own implementation of Unix System V. Release 3.0, running on Prime's EXL Series 386. A fee of \$1,800 will buy you an unlimited license for this DOS-under-Unix program, which offers synergy with PC-Interface and supports the PT250 terminal. Convergent Technologies distributes Merge 386 under CTIX/386, a version of Unix System V. Release 3.0, running on the Server PC series. An unlimited license costs \$1,100; enhancements include a PCcompatible hardware interface. Bell Technologies' Merge 386 under Unix System V/386, Release 3.0 or 3.2, supports the Blit series of graphics engines and such

■ In Unix, a true copy of DOS runs just as it does on a standard PC, so even an ill-behaved program like a TSR should operate normally.

networking protocols as TCP/IP. A one- to two-user license for Bell's Merge 386 costs \$295, and an unlimited license costs \$795. A one- to two-user license for Unix System V/386, Release 3.0, costs \$190 (\$295 for Release 3.2), and an unlimited license costs \$290 (\$795 for Release 3.2).

Microport Systems offers DOS Merge 386, which runs under Microport's Unix variant, Microport System V/386, Release 3.0e. Highly compatible with Locus's original Merge 386 program, Microport's DOS Merge 386 has an advanced driver set as well as doscp, dosdir, and doscat utilities to access DOS diskettes and partitions. DOS Merge 386 costs 5399 for a one- to two-user license. Microport System V/386, Version 3.0e, costs \$299 for a one- to two-user license. Microport System V/386, Version 3.0e, costs \$299 for a one- to two-user license and \$549 for an unlimited license.

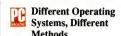
Unisys markets Merge 386 under Unisys System V (based on Unix System V, Release 3.0), running on the Unisys 6000/50 system. An unlimited license for

this program costs \$1,000. Unisys's offering provides synergy with PC-Interface; supports the Unisys UVT 1224G terminal, which consists of a PC-compatible screen and keyboard; and comes with OFIS Ensemble, a program that ensures easy access to the best environment for a particular function, such as Unix for sending mail or DOS for word processing.

FEATURES IN COMMON Enhancements aside, both VP/ix and Merge 386 take a similar approach to supplying a DOS-under-Unix environment. With each, the standard Unix environment is still there, with all its commands, capabilities, and complexity. Each product adds one basic command to the Unix repertoire-the command to start up a DOS environment, which is much like booting DOS on a standard PC and takes about as long as a warm reboot. And, of course, both products use the 386 processor's virtual 8086 mode to create the DOS-under-Unix environment, which mimics the hardware architecture of a standard PC.

Within that environment, a true copy of DOS executes just as it does on a standard PC, which means that even ill-behaved programs like TSRs should operate normally. A single DOS-under-Unix session will run at a speed comparable to that of DOS running on a 386 machine without Unix. When several DOS-under-Unix sessions are running, you'll see a certain amount of performance degradation. But you will usually be able to maintain ATslevel or better performance for each sessions are such as the second of the programment of the

From within the DOS environment. you can enter DOS commands-anything from DIR or TYPE to running your favorite application program. In addition, both DOS-under-Unix products will automatically fire up the right environment to execute whatever command you enter. For example, if you enter Unix's ps (process status) command from the DOS environment, the system will temporarily switch back to Unix, run the ps command, and then switch back to DOS. Similarly, you can enter DOS commands from within the Unix environment. The only drawback to doing so is that your start-up time will be slightly longer than if you were operating in the right environment to start with.



DOS application



The DOS Environment

Whether it's running on an 80286 or 80386 machine, DoS operates the same way. As shown here, the BIOS (Basic input/Output System) handles the lowest level of services DOS handles an intermediate level, and the application program is what the user sees. Because there is no memory protection, an application can reach past DOS to access the BIOS directly, or it can even jump past both to access the hardware.

286 Protected Mode 386 Protected Mode OS/2 applications Unix applications DOS application DOS application DOG OS/2 Dynamic link libraries and device drivers BIOS BIOS Unix Hardware emulation **Device drivers** Hardware Hardware

The OS/2 Environment

This diagram shows how OS/2 juggles protected-mode applications plus a single DOS application unrining in 8086 real mode. OS/2 and the applications writer for it operate in the protected mode of the 80286, shown in blue, while the DOS software operates in 8086 real mode. This arrangement allows OS/2 to operate on both 286- and 386-based machines.

The Unix Environment

The Unix approach, which operates only on 80386-based machines, uses virtual 8086 mode for the DOS sessions. The Unix system and Unix applications operate in the protected mode of the 80386, shown in blue. The role of VPIx and Merge 386 is to create the proper virtual 8086 mode, which involves taking care of two basic chores: emulating the standard hardware that exists on PCs—such as the disk, the keyboard, and the display—and furnishing the BIOS software that DOS and its applications expect. Within each specially crafted virtual 8086 environment, a copy of DOS and a standard application can run as if they were running on an ordinary PC.

■ DOS UNDER UNIX

Another feature common to both programs is the ability to run DOS sessions from a terminal. On standard serial terminals you are limited to running text software; any program that runs on an IBM Monochrome Display Adapter (MDA) should work fine on a terminal. Screen redrawing speeds are slower than for the PC's traditional memory-mapped video adapters, but for many applications a serial terminal works fine.

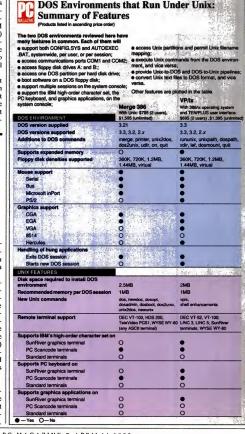
Both Merge 386 and VP/ix support multiple console sessions; hence you can interact with several separate sessions at the same time, but only if you are using the system console. This feature makes it seem as if you have several separate sys-

■ If all you need is a multiuser DOS system, there are more-efficient and less-expensive solutions than a DOSunder-Unix environment.

tem consoles, each simultaneously running either Unix or DOS software. You switch from one session to another using a special hotkey.

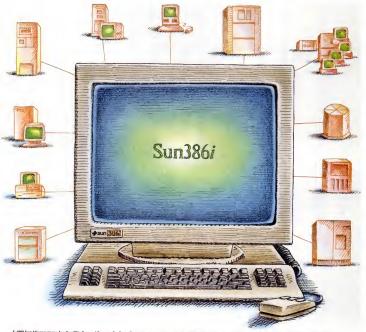
Also important is the fact that both programs support DOS-to-Unix and Unix-to-DOS pipes. Pipes—one of the Unix system's key features—lets you route the output of one program to the input of a second, so that the two can operate synergistically. For example, you can count the number of users on a system by piping the output of Unix's who (display list of users) command to the we (word count) command. By allowing pipes, VP/ix and Merge 386 let you create hybrid programs that bridge DOS and Unix.

A REALITY CHECK While DOSunder-Unix software can run most of the DOS applications software library, it won't run all of it. For example, applications like Windows/386. DESOview 386.



OS/2 promises you the moon.

But it'll ne everything u



E 1989 Sun Microsystems, Inc. Sun386. Sun and Systems for Open Computing are trademarks and Sun Microsystems and the Sun Logo are registered trademarks of Sun Microsystems, Inc.
UNIX is a registered trademark of AT&T. All other products or services mentioned are identified by the trademarks of their respective organizations.

vergive you nder the Sun.

You're looking at a total eclipse of the moon.

Namely, the Sun386i™workstation. Whatever OS/2 does, the Sun386i with UNIX*does better.

Which is not a pie-in-the-sky promise, but a down-to-earth fact.

While the OS/2 operating system limits your network horizons primarily to fellow PCs, the UNIX operating system on the Sun386*i* opens them to the world.

Mainframes, minis and personal computers of every shape and size.

So not only can you save all the IBMs, DECs and Apples you've ever bought, you can effectively tie them all together right on your desk.

And if that's not enough to make you thank your lucky stars, there's this:

You don't have to give up one bit of DOS.

In fact, you can make more out

of it.
Whereas with OS/2 you can ru

Whereas with OS/2, you can run just one DOS program at a time. With the Sun386i's multitasking, you can run all sorts of DOS and UNIX programs at the same time.

Say you're working on currency trading figures under UNIX, you can update your Lotus*1-2-3*spreadsheet under

DOS. Make a Harvard Graphics" slide show under DOS. Cut and paste results of all three into a sophisticated publishing package under UNIX. And E-mail it to the coast.

Simultaneously. Far out, you say?

Not really. Well within reach.

Because you can forget the UNIX hieroglyphics of yesteryear. The Sun386i, with its point-and-click interface and Hypertext help system, is easier to use than most any personal computer.

And it'il no longer take you a sidereal year to figure out how to plug into your corporate network. In this solar system, it's a 30-minute job.

After all, the Sun386 is just part of Sun's concept of Open Computing. A corporate-wide universe of truly distributed computing based on industry standards. Something out of sight for OS/2.

Which just goes to show you.

Once you look at the moon, you'll see how much the Sun really shines.

To find out more, phone 1-800-223-6736. In California 1-800-322-6736.



Systems for Open Computing.™

PSL Computer Products

1-800-2424-PSL

Specially selected computer products at special prices.

GENERAL:	
PFS:Pirst Publisher	\$ 69.95
WordPerfect 5.0	\$224.95
Desgview 2.2	\$ 74.95
Microlytics' Gofer	\$ 37.95
Graph-in-the-Box	\$ 69.95
CompuServe Membership	\$ 24.95
Covox Speech Synthes.	\$ 54.95
Covox Voice Digitizer	\$ 90.95
EDUCATION:	
Math Blaster Plus	\$ 28.95
Reader Rabbit	\$ 21.95
GAMES:	
Nean-18 Golf	\$ 24.95
MS Plight Sim. 3.0	\$ 33.95
Palcon-AT	\$ 33.95
3D Helicopter	\$ 31.95
Leisure Suit Larry	\$ 25.95
Leisure Suit Larry II	\$ 31.95
PROGRAMMING:	
Borland Turbo C	\$ 89.95
Borland Turbo Pascal	\$ 89.95
Turbo Asm/Debugger	\$ 89.95
MS QuickBASIC 4.5	\$ 67.95
BOOK: Glossbrenner's	
Guide to Free Software	
(With \$100 of coupons)	\$ 15.95

NOTICE: The above prices reflect a 4% cash discount. Allow 10 days for personal checks Non-U.S. orders: MC/Visa only. S&H: \$4 or actual if by MC/Visa.

SHAREWARE from the Public (Software) Library

Buy for the price shown (plus S&ID) or try before buying for \$5 per disk

More Shareware to try for \$5/disk	:
Word Perfect 5 Enhancements	
- Macros; 2 disks full	\$10
- Utilities for WP5	\$ 5
- Art image files for WP5	\$ 5
Mean-18 Courses (5 disks)	\$25
HP LaserJet Soft Ponts	
- lots of fonts & utils.	\$ 5
Amortization & Fin. Analysis	\$ 5
Calendar-Making Programs	\$ 5
BBS Lists - 100's of BBS #'s	\$ 5
Clip-art for Printmaster	\$ 5

PSL NEWS - the only major monthly magazine all about pd/shareware. \$18/yr. Call/write for free copy.

P.O. Box 35705 Houston, TX 77235-5705 1-713-665-7017 for info 1-800-2424-PSL to order CIRCLE 529 ON READER SERVICE CARD

DOS UNDER UNIX

Paradox 386, or OS/2, which try to go into the protected modes of the 286 or 386, will definitely not work. The Unix system has already usurped that privilege. Other potential problems are:

■ Applications that perform extensive low-level access to PC hardware. Most PC software does a good job of emulating hardware, but sometimes problems arise when an application bypasses the operat-

ing system to talk directly to the hardware. Applications that are timing-sensitive. Timing is not very predictable in a multiuser environment. Similarly, applications that generate a high interrupt rate may not work well.

■ Applications that perform low-level access to the DOS file system. DOS-under-Unix software primarily uses the Unix file system, which doesn't have the standard DOS directory structure or DOS's File Allocation Table, among other things. Usually this doesn't cause a problem because most programs use DOS file I/O calls. Exceptions are DOS file system repair or enhancement programs. The Unix system has its own utilities for file system repair.

In addition, you'll need to check with prospective vendors to see whether their systems will support such devices as communications boards, networking boards, tape controllers, and data acquisition boards, for which DOS drivers exist.

THE BOTTOM LINE If all you need is a multiuser DOS system, there are moreefficient and less-expensive solutions than a DOS-under-Unix system. If you need a multiuser, multitasking DOS system and you also have a compelling need for Unix, or if your primary operating system is Unix and you need access to the large base of sophisticated DOS applications, then you should think seriously about bringing in a DOS-under-Unix program. If you already use a version of Unix on your 386 machine, the choice of which DOS-under-Unix product to buy has probably already been made for you: some Unix vendors support only VP/ix or a specific variant. some support only Merge 386 or a specific variant, and some don't support either. But if you are thinking about a move to Unix, you should carefully consider whether you want to run VP/ix or Merge 386, then choose your Unix software accordingly.

Merge 386

Merge 386, from Locus Computing Corp., is a highly configurable DOSunder-Unix system. It works solidly, has many options and configuration possibilities, and is a good performer. But Merge 386's chief advantages-its flexibility and configurability-are also weaknesses: you must work hard to make it run the way you want. In addition, Merge 386 lacks some of the amenities that DOS users have come to expect, such as support for VGA (Video Graphics Array) graphics and EMS (expanded memory specification) memory.

Running under Bell Technologies' Unix, Merge 386 is delivered with DOS 3.21. A license for one or two users costs \$695, and an unlimited license costs \$1,195. Furthermore, you can even install your own version of DOS if you prefer: in addition to Version 3.21, the program supports DOS 3.3, 3.2, and 2.x. Like VP/ix. Merge 386 works best with about 1MB of memory available for each active session. in addition to the 2.5MB memory required for the host Unix system. Also like VP/ix. Merge 386 lets you run more tasks than will fit in memory, but with some performance degradation. Unlike VP/ix, however, Merge 386 can be configured to create a DOS environment containing less



FACT FILE



Merge 386 Locus Computing Corp. 9800 La Cienega Blvd. Inglewood, CA 90301 (213) 670-6500 List Price: Without

Unix operating system: license for one or two users, \$695; unlimited license, \$1,195. With Bell Technologies' Unix: license for one or

two users, \$795; unlimited license, \$1,595. PCILib: \$995 Requires: 2.5MB RAM, 30MB hard disk (DOS 3.21 included).

In Short: A highly configurable and flexible DOS-under-Unix environment designed for multiuser systems under heavy load. Not copy protected.

CIRCLE 424 ON READER SERVICE CARI

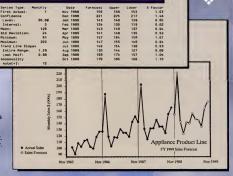
Make expert business forecasts in minutes—with Lotus and TrendSetter Expert.

Business forecasts drive business decisions. Better forecasts mean better decisions.

How many units will be sold?
How many parts to order? How
many assemblies to manufacture?
How high will expenses be? How many
students will register? How many rooms
will be rented? How much cash will be
needed? How do you know?

You can hire a forecasting expert. A statision who may use Auto-correlation, Brown's Double Exponential Smoothing, and Linear Regression Analysis. And then apply experience and judgment to arrive at your forecast. In a day, or maybe a week. For \$100 an hour.

Or you can buy a forecasting expert. The TrendSetter Expert. It does the same thing. In minutes. For \$149. Period.



Make expert business forecasts. Verify forecasts made by others. In four easy steps.

Start with history data, such as monthly sales for the last two years, on a Lotus 1-2-3® or Symphony® worksheet. Then invoke the TrendSetter Add-in, and:

- O Show TrendSetter where your data is,
- 2 Tell it how far in the future to forecast,
- Show it where to put the results, and
- @ "Go".

TrendSetter puts results directly on your worksheet, showing upper and lower bounds for the forecast plue other measures of statistical accuracy. The manual explains what they mean. You can easily modify forecasts with Lotus to reflect your own judgment. TrendSetter even writes Lotus macros so you can graph your forecasts at the press of a key.

That's it! With Add-in convenience.

TrendSetter Expert makes consistently better forecasts. Here's how.

TrendSetter Expert uses time-series extrapolation techniques to forecast future values based on the past. Proprietary expert-systems logic examines the history data and combines several sophisticated statistical analysis techniques to produce the forecast. TrendSetter Expert even allows for seasonality to accommodate, for example, yearly holiday sales peaks.

Just how good are TrendSetter Expert forecasts? Superlative! In a widely respected forecasting competition, 24 different forecasting methods were pitted against 111 sets of diverse real-world data. Using the same data, TrendSetter produces more accurate forecasts for 88% of the test cases, and better than the average for the rest! (Details available on request.)

Satisfaction guaranteed, or your money back!*

Don't misunderstand. No forecasting method is perfect. But TrendSetter Expert will help you make better forecasts than you do today. Guaranteed. Or your money back.*

So don't wait! Make an expert business decision right now. So you can make expert business forecasts in the future. Buy TrendSetter Expert.

Only \$149!

To order, or for more information and the name of the dealer nearest you, call:

800-325-9035

In Mass., call 508-366-1122.

"If you aren't satisfied for any reason, return TrendSetter for a refund (if purchased directly from Concentric or an Authorized Reseller).

TrendSetter Expert works as an Add-in with 1-23 Relasses 2 and 2.01, and with Symphory Releases 1.1 and 2.00 in 18Me 7.0 and compatibles with PC-DOS 2.1 or later and a hard disk. 5.25" and 3.5" diskettes included.

Another timesaving tool from the authors of R&R Relational Report Writer® for dBASE® and R&R Worksheet Report Writer™ for Lotus.



Concentric Data Systems, Inc. 18 Lyman Street, Westboro, MA 01581

EXTENDING THE VIRTUAL 8086 ENVIRONMENT

Emulating the standard hardware/BIOS environment of a PC using the 80386 processor's virtual 8086 mode is no small feat, but it's necessary if you want your DOS-under-Unix system to be able to use the slew of peripherals and facilities—scanners, networks, mainframe communications, graphics tablets, joysticks, trackballs, and others—that are part of the PC's everyday environment. None of these are emulated in the standard VPlix or Merg 386 environments, but they can be accommodated by extending those environments.

The first level of support offered by both products allows a DOS session direct access to a device on the PC bus. In Merge 386 parlance, this is called DDA (direct DOS attach). In VPiiz, it's also called DDA, but it stands for "direct device access." In both cases, DDA lets a single DOS session use a hardware device that isn't in the standard set of supnorted devices.

When you use DDA, the virtual 8086 environment is set up so that accesses to the device's addresses go directly to the device, just as if the program were running in real mode on a standard DOS system. This happens even as all other accesses to "standard" hardware addresses go to emulated devices rather than directive to the bus. Interrupts by DDA devices

activate a generic Unix interrupt handler, which relays each interrupt into the proper virtual 8086 session.

The big advantage of DDA is that it is easy to use. (Both Locus Computing and Interactive Systems report that a sizeable number of their users are working with DDA.) You just specify the I/O ports, memory addresses, interrupt vectors, and DMA (direct memory access) channels that are used by the device in question; then you ask to use that device when you are starting a DOS session. VP/ix and Merge 386 have similar capabilities in this area, except that only Merge 386 supports DMA.

VP/ix and Merge 386 also allow you to create drivers for specialized devices such as network interfaces. This process is much more complicated and expensive than DDA, and you need a talented systems programmer to write the code. For the most part, this step is taken by OEMs and system integrators to meet the needs of a large client base. Few end users, if any, write device drivers.

Although it takes a lot of talent and effort to write device drivers, these tools have several advantages. With a device driver, you can field interrupts more rapidly and with less overhead than when you use DDA interrupt handling. Another advantage is that some devices, such

as network interfaces, can be shared by multiple DOS sessions if they are accessed through a device driver. (When they are accessed through DDA, only one session at a time can use the device.) And with VPitz, you must use a device-driver to interface to a device that uses DMA data transfers. (Merge 386 can handle many such devices with DDA.) VPitz comes with all you need to create a device driver, whereas Locus recommends that you contact its teshnical support staff and work closely with them if you choose to create one.

Another approach to extending the environment involves developing programs that bridge the chasm between DOS and Unix. With Merge 386's PCI. Lib facility or Pylir's Channels facility, you can write a distributed application—for example, a DOS user interface program that uses a Unix database server. PCILib costs \$995'. Channels is included with the VPI/x package.

DDA lets DOS sessions access unusual hardware. Device drivers, while more demanding to create, let you manage more hardware, more efficiently. Both Merge 386 and VPIx offer software libraries that let you gain mastery over distributed applications. Both products cover the bases and the turf in between. —Kaare Christian

than 640K of RAM, which reduces the strain on system memory.

The documentation that comes with Merge 386 contains all the information you'll need—but don't expect light reading. Although the program's installation procedure is so easy to follow that you probably won't need to consult the manual, you will have to slog through it to configure and turn the program.

The documentation consists of a thick manual that deals with Version 1.0 of the program, plus a skinny bookle on Version 1.1. Don't make the mistake of overlooking this second pamphlet; Version 1.1 includes a lot of important enhancements you'll want to know about. It would be

more helpful if Locus provided one unified manual that covered all the bases.

Merge 386 lets you run most DOS commands from the Unix environment and most Unix commands from the DOS environment. True to its name, it merges two worlds, allowing you to install new software that will be accessible from both and to create pipes from one environment to the other. By default, both environments use the Unix file system. If you have a DOS partition on your hard disk, it is accessible only to DOS software.

Merge contains a screen-switch utility that lets you sequence from one active session to another. Although serial-terminal users can run only one session at a time. console users can run multiple DOS and Unix sessions, conveniently switching from one to the other:

A COMFORTABLE SETUP When Merge 386 starts to run, the program assigns the C: drive to the Unix file system. COMMAND. COM and CONFIG. SYS files exist in the Unix root directory, just as they would in the root directory of a standard DOS C: drive. I liked this arrangement because the C: drive is the place to be when you're running DOS. You can also put your personal AUTOEXEC. BAT and CONFIG. SYS files in your home directory, executing them in addition to or in place of the systemwide files stored in the 10

59-A Peterborough Road Burlington, VT 05401

Finally, dBASE® and Lotus® have something in common.

100 lb Confec. Sugar 250 1b Cane Sugar Baker's Chocolate 5 Gal Molasses

o cy dyyr

yreeklin Smith
Wabbott Leboretoriee
Wabbott Sax 113
97.0. Box 113
97.0. Box

Meidi K. Earrington Competies, Stuff 20 Eastes, BY 10573 Bye Brook, BY

& Cooper A. Astia 78818

Database reports without programming with R&R report writers.

R&R helps you create reports quickly, without programming, directly from related databases. Use for turnkey systems and ad hoc reporting. Print in any layout, from columnar listings and mailing labels to preprinted forms and form letters. R&R is full-featured and flexible, so you can concentrate on making reports show exactly what you want to show, in exactly the way you want to show it. Any report.

Perform calculations as needed, including totals and subtotals. Sort and group records in any order. Select records with plain-English query. Save time with automatic TRIM, word-wrap, justification, currency, and date formats. Improve appearance with bold, italics, underline, different fonts, and graphics characters.

Lotus-like menus, WYSIWYG screen-painting, and HELP system make It easy to learn R&R. And since R&R report writers look alike, when you've learned one you know them both.



Relational Report Writers

Works with dBASE III, dBASE IV, dBXL", Quicksliver", and file-compatibles, Includes royalty-free runtime that requires only 25 KB of memory. Network support standard. Clipper" and FoxBASE+" Module required for .NTX and .IDX Indexes, \$49.95.

For dBASE III® and dBASE IV™. Paces (MS-DOS) and N

72460

Semije Henufecters

Vieston-Salen, MC Z

Birthdays

(508) 423-240



... a stunning combination of a comfortable and informative user interface, supremely easy access to multiple related files, and extensive report design and enhancement tools. Usable by novice and expert alike, it is superb for generating either straightforward or complex report output...." 12/8/87.

One of "The 100 Top-Rated Products of 1987." InfoWorld, 12/28/87.



Awarded Most Useful Add-On Product for dBASE by 1988 dBASE Developer Conference attendees. Ashton-Tate, September 1988.

55.00

Poy this as



23467

Worksheet Report Writer

Works with Lotus database worksheets or ranges, Works as add-in or add-on with 1-2-3, Symphony, and worksheetcompatible products. Requires 20 KB as add-in. Network support standard, Replaces Lotus 1-2-3 Report Writer", and includes program to convert existing reports to R&R.

For Lotus 1-2-3® and Symphony®.

Sales Registers Invoices Form Letters Statements Mailing Labels Aged Receivables

Arcedia, Cy 31006

COD Tags Purchase Orders Customer Lists

> Telephone Directories Sales

Analyses Advertising Schedules and more

R&R report writersthe standard for database reporting 30-Day Moneyback Guarantee!

CIRCLE 113 ON READER SERVICE CARD
To order, or for more information and the name of the dealer nearest you, call:

> 800-325-9035 in Mass., call 508-366-1122.

Concentric Data Systems, Inc. 18 Lyman Street, Westboro, MA 01581

23340 00210 Full Mouth X-Ray 06/06/88 23340 Check #428 06/15/88 06/15/88 Silver Amalgam 02120 Tooth #12 23467 06/15/88 Silver Amalgam 02120 Tooth #13

BRINGING DOS COMPATIBILITY TO NON-80x86-BASED SYSTEMS

If you need to run a DOS application on a non-80x86-based machine, you can effect DOS compatibility by using one of two programs: Hunter Systems' XDOS or Insignia Solutions' SoftPC.

Like it or not, if you use non-DOS hardware, you might occasionally need to run a DOS program. You may receive a file in a format that's not readable by any program native to your system; you may have to run a program that was developed in-house under DOS and cannot be readily translated; or you may simply need to run a corporate standard like Lotus 1-2-3, DisplayWrite, or dBASE III Plus.

On non-DOS systems that use 80x86 processors, programs like Interactive Systems' VPiix and Locus's Merge 386 can provide DOS compatibility through the processor. But systems based on different architectures require more complex solutions. The most obvious answer is to put an 80x86 processor on a card and transfer program execution to the card. This is the approach AST Research took with its AST Mac286 card for the Macintosh 11. This add-in board gives true 80286 instruction-set compatibility to the Macintosh, but at substantial expense and with a loss of integration.

The less-obvious answer is to effect DOS compatibility through software. And that's just what Insignia Solutions tosaed in Sunnyvale, Calif.) and Hunter Systems (Mountain View. Calif.) are doing with their respective programs SofPC (SS95 for the Macintosh II and SE) and XDOS (S325 to S975 for Unixbased machines).

In addition to the Mac II and SE,



SoftPC, \$595 from Insignia Solutions, emulates the Intel 8088 through software, thus enabling a Macintosh II or SE to run any DOS application,

SoftPC supports the Sun 3, the HP 9000 Series 800, the Tektronix 4200 and 4300, and the Integraph Clipper chip running on the Integrap 52 or 34. Among the systems that XDOS supports are the Sun 3, the Apollo, the NCR Tower, the Motorola 8000, the Acer Counterpoint, the Sony NEWS workstation, and the Hewlett-Packard 9000. You can call Insignia Solutions at (408) 522-7600 and Hunter Systems at 4(15) 965-2400.

The approaches taken by SoftPC and XOOS differ from the start. SoftPC allook you to run any off-the-shelf DOS application without modification by emulating the Intel 8088. With XDOS, however, you recompile 80x86-based programs, optimizing them for the new environment.

INVISIBLE TRANSLATIONS Soft— PC's designers believe that translations should be transparent to the user. Insignia has made a theatrical move: when you launch the Macintosh version of SoftPC. it greets you with the simulated sound of a floppy disk drive head moving and a beep—the familiar sounds of milbar PC-XT booting up. From then on, its simulation of the DOS environment is almost cerfect.

SofiPC makes several concessions to hardware differences. You can make the built-in mouse emulate a Microsoff Mouse, and if you have Apple's external 5½-inch drive or the DaynaFile, you can define it as the A: drive. The next major release, which should be out by the time you read this, will support Apple's new

root directory. Drive D: accesses your home directory, and drive E: accesses the DOS partition, if there is one, on your hard disk. Most people will find this a comfort-

able and comprehensible setup.

A host of options let you fine-tune

Merge 386's performance. Version 1.0 featured the dosadmin and dosopt commands, which are designed for tailoring the default operation of Merge. These commands let you specify the amount of memory used, the default console screen

type, printer operations, the attachment of special devices to your session, and the use of systemwide or user-specific CON-FIG.SYS and AUTOEXEC.BAT files. Version 1.1 adds the Merge command, which is designed to manage new 1.1 op-

3½-inch Smartdrive, allowing access to 3½-inch IBM floppy disks on machines equipped with it. Every DOS program we tested would run straight out of the box when used with this program.

While SoftPC's simulation of an 80x86-based DOS environment seems ideal, it comes with a severe performance penalty. On a 16-MHz 68030-based Macintosh IIx—the fastest machine that Apple makes—SoftPC takes roughly 1.2 times as long as an IBM PC AT or PC-XT. While this is acceptable for occasional use, you'll waste a phenomenal amount of processing power if running DOS applications represents a substantial amount of your computing time.

PERMANENT CONVERSION Where SoftPC simulates the 80x86 pro-

Where SoftPC simulates the 80x86 processor, allowing existing DOS programs to run unaltered, XDOS permanently converts them to 680x0-based binary code. This approach has two advantages. Performance is much better than could be achieved through software emulation, since there is little overhead introduced by the simulation at runtime. And since you are using a native Unix program, you have full access to the Unix system's memory, disks, peripherals, and multirasking abilitrasking ab

XDOS handles basic differences between the DOS and Unix environments in the translation. A runtime module on the Unix system handles environmentspecific issues like video calls. In the recompilation, these activities are directed to routines in the runtime module, which differs from one implementation of Unix to another. Since the recompiled core program accesses these routines in the same way no matter what the system, the program is the same for any Unix implementation you run it on. Support for additional environments is achieved by simply replacing the runtime module. Hunter Systems readily admits that performance will be 70 to 90 percent as efficient as the same program rewritten from the bottom up for the new system.

So you're sold; how do you get XDOS and how much does it cost? At present, this is the biggest catch. If you want to run popular DOS applications that XDOS already supports, such as Lotus 1-2-3, dBASE III Plus, WordPerfect, Microsoft Word, AutoCAD, and Ventura Publisher, then XDOS is a solution you can use today. Hunter Systems can supply you with the tools necessary to convert existing copies of your DOS programs into Unix versions. But if you want to convert an unsupported third-party program or one developed in-house, it won't be that easy. Hunter Systems would rather make royalty arrangements with software manufacturers than let its tools loose on the world. It does not provide Analyzer, which determines recompilation strategies, to the public. In time, it may offer this program for lease only. Among new applications, this will probably limit its usefulness to major operations.

If you want DOS, with its familiar prompts and utilities, on a non-80x86 system, SoftPC is a good solution that doesn't require the addition of hardware. SoftPC will also deliver what you need if you occasionally want to run a DOS application, or if you want to run a program that was developed in-house, and speed is not particularly important. With SoftPC, you should be able to run any DOS application—even RAM-resident utilities and programs that use disk-based copy-protection schemes.

XDOS, on the other hand, will let you apply almost full system power and function to DOS applications by recompiling them as Unix applications on non-80x86 systems—but only if they are currently supported by XDOS. If you want to run homegrown applications or those that are not on the supported list, then XDOS cannot help you, at least not at this time.

Of course, if you are using a system that is not 80.86-based and you want to run a variety of DOS utilities and programs often, then something is wrong with your basic setup. You are best off investing in a secondary system that runs DOS, or else switching to alternative programs available in your native environment.—Philip F. H. Rose

Philip F. H. Rose is a project leader at PC Labs.

tions; you can set the DOS clock rate to 1 tick per second or the standard 18 ticks per second, and you can force applications that poll the keyboard to sleep, thereby boosting performance for other system tasks.

Although commands like these afford

us great control over our software, naturally we want the defaults to work most of the time. After all, a DOS-under-Unix product should boot up DOS and run DOS programs with no hassles. My first frustration with Merge 386 came when I tried to run

the PC Labs benchmark tests and found that some of the timing results were skewed. This occurred because, by default, Merge's DOS clock ticks just once per second, not 18 times as in a normal DOS machine. (Since most DOS software



If you're looking for an easy-touse database that's compatible with dBASE, you've found it.

It's menu-driven PC-File:dB, the database for a little price that packs a very big wallop.

Just for grins try mail merge, report writing, quick labels, advanced graphing, macros and LAN support on for size.

Then add compatibility with dBASE III Plus or dBASE IV databases.

That's a lot for \$89.95.

So see your dealer today. For once it's the program that'll knock you out, not the price tag.

For the name of the dealer nearest you, call 1-800-JBUTTON. (In WA state 206-454-0479.)

ButtonWare

ButtonWere, Inc., P.O. Box 96058, Bellevue, WA 98009, 206-454-0479.

\$5.00 for shoping and handling.
PC-File dB is a trademark of ButtonWare, Inc.
dBASE III Plus and dBASE IV are registered trademark.

DOS UNDER UNIX

is not sensitive to the clock tick rate, this isn't a major problem. But it does illustrate Locus's philosophy: Performance comes before convenience.) If you encounter a similar problem, don't look in the manual for the solution; it's described only in the Version 1.1 Release Notes.

A JUDGE'S DECISION Locus Computing claims that Merge 386 is the DOS-under-Unix performance champ. The claim is based partly on how the vendor wrote the software and partly on the many configuration options that let you tune the environment for your software. PC Labs' multitasking benchmark tests do suggest an edge for Merge 386, but this is definite-

■ PC Labs' multitasking benchmark tests suggest an edge for *Merge 386*, but this is definitely a judge's decision, not a knockout

ly a judge's decision, not a knockout. We tested Merge 386 running under Bell Technologies' Unix System V, Release 3.0, on a Compaq Deskpro 386/20 with 7MB of memory and a 60MB disk. What did we find? When just one task is active, Merge 386 is significantly ahead on I/O (DOS File Access tests), but both programs clock in at about the same speed when performing computationally intensive operations (80386 Instruction Mix and Conventional Memory tests). Both programs slow down as background jobs put a load on the system; overall, Merge 386 remains slightly ahead in both computational and I/O efficiency.

Merge 386 gives you three options for graphics on an EGA console: CGA graphics, EGA graphics, or Fast EGA graphics. Support for VGA graphics is sorely lacking. In its ordinary EGA graphics mode, Merge 386 is pretty slow and would probably frustrate people who are used to the fast

video speeds of 386 machines. But Merge 386 speeds up significantly in Fast EGA graphics mode, outperforming VP/ix. The problem with this mode is that you lose the screen-switching ability on the console, which is the key to working with the system from the console.

In further testing, a remarkable finding was connected with Merge's video performance when using a serial terminal. The internal mechanism involved looks for changes in a virtual screen buffer that the system maintains. PC Labs' video benchmark tests are analogous to political speeches: they repeatedly write the same thing to the screen. Because Merge is looking for changes, it sends little information down the slow serial line to the terminal. thereby producing winning but terribly misleading numbers. Normally, Merge's video display speeds would be comparable to those of VP/ix, because real applications don't just idly redraw the screen.

COMPATIBILITY TESTS The standard harbingers of doom for nonstandard PCs—Louis 1-2-3, Microsoft Flight Simulator, Microsoft Word, and Microsoft Windows—worked fine in the Merge 386 environment. 1-2-3 and Word worked both on the console and on serial terminals. The trouble with both Windows and Word on the console was speed. Both seemed pretty sluggish when I used the standard EGA mode, but I was very reluctant to use the Fast EGA mode because I value the program's screen-switching function.

I encountered an impasse in trying to run DESQview, Version 2.0. At each attempt the opening screen appeared, followed by an ugly "Divide by zero" message, which hung the DOS session. I tried several of the Merge options but couldn't get around this problem. Merge 386 leaves little reason to run pseudo-multitaskers like DESQview, but it should still be able to handle them.

Overall, Merge 386 is a reliable performer with a wide variety of hooks and controls that are great if you're looking for a program with a high degree of flexibility and configurability. But you must work hard to gain these benefits, sometimes having to think about your operating environment when you'd rather be thinking about the task at hand.

Easy.



Powerful.



Why Compromise?

The choice is yours...

FormWorx*

Create Custom Forms, With FormWorx you can easily make any form...soon after opening the package! Intuitive pull-down menus and clear documentation help you customize one of the many generic forms provided. Or you can start from scratch. Either way, your business forms will truly look businesslike using FormWorx, the only program in its price range that let's you easily mix multiple fonts and type in between single-spaced lines.

FormWorx with Fill & File™

FormWorx with Fill & File does everything FormWork does plus it lets you...

Fill Out Pre-printed and

Custom Forms, Simply tab from blank to blank and fill any form right on screen. Entries go exactly where they belong! Print just the data onto standard, pre-printed forms, or form and data together onto blank paper. On laser and dot matrix printers. The program even does math!

	Forestore	Formfood	Formfilet	1.1	Perform I	ForeFill
Creates custom forms	•	•		•	•	•
Fills out pre-printed and custom forms.			•	•	•	•
Reads writes dRASE files directly						•
Does math			•		•	•
Programmable Automates forms processing						•
List price	895	\$95	\$149	\$195	\$259.95	\$149

Choose FormWorx or FormWorx with Fill & File. But don't settle for anything in between.

Read/Write dBASE® Files

Directly, Fill & File is the only forms program that allows you to re-use your data with any form. If you've typed it once, why type it again? Up to 4,000 characters per field. 128 fields per record. 32,000 records per file! No need for all those cumbersome file cabinets cluttering your office space!

Automate Forms Processing. Only Fill & File is programmable allowing you to create custom menus and insure standardized forms completion. So, your staff can fill out forms without ever having to know the software. It

saves them time and you money.

So Why Compromise? FormWorx is the easiest form maker around. And FormWorx with Fill & File is the most comprehensive forms processor. New! Both packages now contain over 70 generic forms, exceptional manuals, pop-up calendar and calculator. Don't settle for less.

See your dealer immediately or phone today for fast delivery! 800-992-0085 or 617-890-4499



Reservoir Place, 1601 Trapelo Road, Waltham, MA 02154

tee on direct purchases. When ordering by mail, include \$6.75 for shipping in U.S. and Canada. Air mail to Europe/So. America—\$18. All other locations—\$28. in Mass.

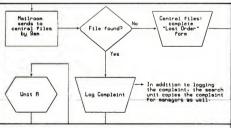
See accepted from government agencies, institutions, and rated comporations. FormWorx is a registered trademark and FormWorx with Fall & File is a trademark of FormWorx. 30-day money back guarantee on direct add 5% sales tax. Purchase orders accepted fr Corporation. All other trademarks acknowled

FASYFI OW

An on-screen flowchart processor that knows about flowcharts - not just another "screen draw" program that makes you do most of the work. EASYFLOW is a powerful full-screen graphics program dedicated to flowcharts and organization charts. With it you can quickly compose charts. More important, you can easily modify charts so they are always up to date.

- ► Automatic: Fully automatic text centering within shapes, both horizontally and vertically. Fully automatic line routing & re-routing.
- Fast: Written in assembly language for speed.
- ► Large: Charts up to 417 columns wide by 225 lines high. Chart too large for your printer? EASYFLOW automatically breaks the chart up & prints it in page size pieces.
- Standard: All standard flowcharting shapes included. Custom shapes can be ordered. ► User friendly: Don't take our word for it. PC Magazine says "EASYFLOW lives
- up to its name. It's hard to imagine any easier and more flexible way to produce basic and even complex flowcharts". [March 10th 1987 issue, page 278.]
- Mouse: Optional but fully supported.
- ► It prints: On most popular matrix printers including IBM, Eoson, Toshiba, HP LaserJet, LaserJet-Plus and many others.
- ► It plots: On HP7440, 7475, 7550, 7570, 7585B and compatible plotters.
- ► It works: We are contractually prevented from mentioning the name of the "big eight" accounting firm that purchased a world-wide site license, but we can tell you that they spent months evaluating all available flowcharting packages before choosing EASYFLOW.
- ► Rush delivery: Order by noon today (eastern time) and you'll have it tomorrow. Rush delivery charge is \$10.50 (instead of \$2.00) and is available only to continental USA and Canada.
- ▶ Documented: 100 page manual plus over 150 screens of context sensitive help. EASYFLOW works on IBM PC's, IBM PS/2 and compatibles, Requires 384 K memory, DOS 2.0 or higher and an IBM CGA/EGA/VGA or Hercules monochrome compatible

Order direct for only \$149.95 + \$2.00 S&H (USA/Canada), \$10.00 (foreign), Payment by M.O., cheque, VISA, Mastercard or Company PO.



The chart fragment above was produced on an HP LaserJet-Plus and is actual size and unretouched. Publication quality charts like this can be produced using only minutes of preparation time and seconds of print time.

HavenTree Software Limited PO Box 1093-P Thousand Island Park, NY 13692 Order Desk: 1-800-267-0668 Information: (613) 544-6035 ext 49 Telefax(G3): (613) 544-9632

CIRCLE 201 ON READER SERVICE CARD

■ DOS UNDER UNIX

VP/ix

If you're looking for a DOS-under-Unix environment that will tide you over until the next millennium, check out VP/ix, a joint venture of Interactive Systems Corn and Phoenix Technologies. This program runs most DOS applications, supports VGA graphics as well as EMS, and handles the exciting SunRiver high-speed. high-resolution graphics terminal, so that several users can simultaneously use DOS (or Unix) graphics software.

VP/ix runs under Interactive Systems' own Unix variant, 386/ix, and is delivered with DOS 3.3. If you prefer, you can use your own version of DOS, since the program also supports DOS 3.2 and 2.x. The program costs \$695 for a two-user license. and \$1,395 for an unlimited license. The VP/ix package contains a useful and thorough manual, replete with easy-to-use scripts for installation and most aspects of system administration.

You should set aside about IMB for each active VP/ix session in addition to the memory requirement for the host Unix system, which is usually 2MB. Because Unix can run more tasks than will fit in the memory, you can run about five simultaneous VP/ix sessions on a machine with only 4MB memory. But you will nonethe-



FACT FILE



VP/ix Interactive Systems Com 2401 Colorado Ave.

Santa Monica, CA 90404 (213) 453-8649 List Price: License for

one or two users. \$695: unlimited license. \$1,395 (includes VP/ix, 386/ix operating system, TEN/PLUS user interface, and Channels Facility).

Requires: 2MB RAM, 40MB hard disk (DOS 3.3 included).

In Short: An easy-to-use DOS-under-Unix environment that supports EMS memory as well as VGA graphics. Designed for convenience more than for flexibility. Not copy protected

CIRCLE 425 ON READER SERVICE CARD

Why Pay More?

"You can have the power and performance of the IBM PC/AT for half the price."



ALTEC-XT / 10 TURBO SYSTEM \$595.00

- * 8088-1 PROCESSOR * 4.77/10 MHz DUAL SPEED
- * 640K RAM
- * 150W POWER SUPPLY
- * 1 SERIAL/1 PARALLEL/1
- GAME PORT * CLOCK / CALENDAR W / BATTERY BACKUP
- *84-KEY KEYBOARD
- * 360K FLOPPY DRIVE
- * PHOENIX BIOS

- ALTEC-286/10 \$ 875.00 ALTEC-286/12 \$ 975.00 ALTEC-286/16 \$1275.00
- * 80286 PROCESSOR RUNNING AT
- 6/10 OR 12 OR 16 MHz *512K RAM
- * 80287 SUPPORT
- * DUAL HDD/FDD CONTROLLER * CLOCK/CALENDAR WITH BATTERY BACKUP
- * 200W POWER SUPPLY
- * 1 SERIAL/1 PARALLEL PORT
- * 1.2MB FLOPPY DRIVE * ENHANCED 101 KEYBOARD
- * PHOENIX/AWARD BIOS

ZIP -386/20 * 80386 PROCESSOR RUNNING AT

ALTEC ZIP -386/16

- 6/8 /16 OR 20 MHz * 1MB RAM (EXPANDABLE TO 8MB)
- * 80287 / 80387 SUPPORT

 * DUAL HDD/FDD CONTROLLER

 * CLOCK/CALENDAR W/BATTERY
- BACKUP
- * 200W POWER SUPPLY
- * 1 SERIAL/1 PARALLEL PORT
- * 1.2 MB FLOPPY DRIVE * ENHANCED 101 KEYBOARD
- * PHOENIX/AWARD BIOS

TO ORDER, CALL 800-255-9971

International inquiry: 213-888-9100 Technical support : 213-888-0269 FAX 213-888-6687



5751 Rickenbacker Road Los Angeles, CA 90040 MON - FRI 9-6

\$1795.00

\$1995.00

MAGAZINE

*All Prices and specifications are subject to change without notice.
*ALTEC can not be responsible for errors in typography or photography.

*We reserve the right to substitute equivalent parts. *All brand of product names are trademarks or registered trademarks of their respective company.



Benchmark Tests: DOS-under-Unix Environments

D C Labs tested VP/ix and Merge 386 using our standard suite of system benchmark tests as well as our multitasking load tests. We also ran the File Access tests against file space in the Unix partition of the disk. Both products supported this feature and performed significantly better than when they used the DOS partition.

In the B0386 Instruction Mix and Fise Access tests, Marge 385 performed faster than VP/£x on the same hardware, but not by much. Marge 386's lead in our single-tasking processor tests was consistent but not so large that it should sway a purchasing decision. Marge 368's performance on the File Access tests, Marge 369, or the small-record File Access test. Marge 369, the performance on the File Access tests, Marge 369, and the particular tests where a selficient as VP/£x.

Both VP/ic and Mergo 386 held up well under the pressure of our multitakenjo doal tests. VP/ic fel behind somewhat when performing the multitasking DOS File Access tests. but ourperformed Mergo 386 on some of the Conventional Memory and 90396 instruction Mix tests. This contrasts with Mergo 386 is tester times in our tests without multitasking, and highlights the pedagage different strengths and well-research. Since produges different strengths and well-research. Since yet also well and the second of the sepects that reflect your needs to determine which package will be the better performer in your environment.

PC Labs' multitasking operating system benchmark sets determine the amount of performance degradation that operating environments suffer as they process more tasks. The tests use versions of the 8006 instruction Mix and DOS File Access tests, which have been modified to run continuously. The modified instruction Mix test accesses the processor and writes to the screen constantly, thus amulating a busy, processor-intensive application program. Smillarly, the modified DOS File Access

application program. Similarly, the modified LVS rise Access test enuleties an II Orienteriva program. Testing was conducted on a Compaq Design 386-20 with e Modified test of the test sessions of either modified benchmark test running in the background, we are our standard 00366 instruction Mix, Conventional Memory, and DOS File Access benchmark tests.

The 80368 Instruction Mix toochmark test measures the

time It takes to execute a selectid series of processor-intensive tasks. The test program uses 80386 instruction code. These instructions rate a subset of the total processor instruction set. The 80386 instruction set of 22-bit operations in the 80386 instruction filts implements a number of 32-bit operations, in the 80386 processor these become single instructions, whereas in the 80386 instruction set. The second set of the second second set of the second se

whereas in the eupo and ouzob versions or the benchment test they remain multiple instructions.

The Conventional Memory benchment test allocates 256K of conventional memory and trest it as e series of 64-byte records. Then, 16.384 random records are read into and written from this memory. The result shown is the average of the read and write times.

The DOS File Access benchmerk test measures the throughput rate of the disk being tested. In this case, throughput tested the disk being tested. In this case, throughput tested are measured in terms of how long the disk takes to perform common DOS file-management functions. Five tasks—file creation, sequential file treats, and on file write, sequential file read, random file write, early and the results summer.

results summed.

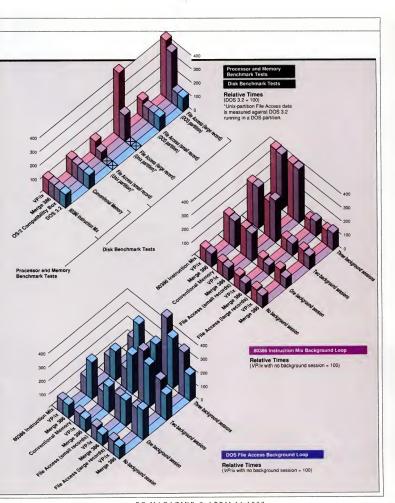
The test is carried out for two different types of files—small-record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and large records are hypically used for word processing and spreachast files. Loading e DOS program is also simulated by the large-record seat.

	Processor and Memory Benchmark Tests			Disk Benchmark Tests		
Performance Times (Times given in seconds)	80386 Instruc- tion Mix	Conven- tional Memory	File Access (small record) (Unix partition)	File Access (large record) (Unix partition)	File Access (small record) (DOS partition)	File Access (large record) (DOS partition)
VP/Ix	3.12	0.46	59.92	48.78	70.07	44.09
Merge 386	3.02	0.43	33.61	19.77	54.38	38.56
OS/2 Compatibility Box	2.94	0.41	N/A	N/A	56.35	10.69
DOS 3.2	2.91	0.40	N/A	N/A	57.29	10.46

N/A—Not applicable: OS/2 and DOS do not have Unix partitions.

Performance Times (Times given in seconds)	No background seasion	One 80386 Instruction Mix background session	Two 80386 instruction Mix background sessions	Three 80386 Instruction Mix background sessions
80386 Instruction Mix				
VP/lx	3.12	6.24	9.28	12.59
Merge 386	3.02	6.04	9.43	12.45
Conventional Memory				
VP/ix	0.46	0.95	1.21	1.83
Merge 386	0.43	0.92	1.40	1.81
DOS File Access (amail	record)			
VP/lx	70.17	60.15	60.94	61.88
Merge 386	54.38	48.44	61.62	76.45
DOS File Accese (large r	ecord)			
VP/ix	44.15	47.39	47.33	47.27
Merge 386	38.56	33.27	42.18	54.39

Performance Times (Times given in seconds)	No beckground session	One DOS File Access background session	Two DOS File Access background sessions	Three DOS File Access background sessions
80386 Instruction Mix				
VP/Ix	3.12	4.07	4.26	4.18
Merge 386	3.02	8.44	6.59	8.37
Conventional Memory				
VPAX	0.46	0.59	0.70	0.71
Merge 386	0.43	0.89	1.30	1.02
DOS File Access (small re	ecord)			
VP/Ix	70.17	132.67	266.07	337.78
Merge 386	54.38	130.17	216.16	255.74
DOS File Access (large re	cord)			
VP/Ix	44.15	86.71	117.77	144.95
Merce 386	38.56	95.90	84.40	85.36



MORE FOR YOUR MONEY FROM...

CALL

Dbase IV Dbase IV LANpack ... Dbase III Plus 1.1 Special ...CALL ...CALL 200 Multimate Advantage II 1.0 Framework III 1.0 Form Tool 2.01 .. Personal Lawyer Boriand international Fureka 1.0 ... 414 Managing Your Money (Meca)

print checks, set up budgets or a

retirement plan, estimate your taxes and net worth. This integrated personal and

small business finance program does all this and more (Business) \$119.

Quattro w/SQZ+ 1.0

PrintShop 2.41 (w/graphics libr.1)* ..39 PrintShop 2.41 (wgraphics libr.1)* Central Point Copy II PC 5.0 Computer Associates SuperCalc 5 1.0 Core international Corefast 2.0 Crosstalk Communicationa Crosstalk VJ 3.7

133

319

95.

50 45 Nantucket 159

Sidekick Plus 1.0

Crosstalk XVI 3.7

Dac Software

Dac Easy Accounting 3.0

Dac Easy Light 1.0

Dac Easy Report

Delrina Tach.

Per:FORM 1.0

Digital Research Gem III Present, To

ALL STREET, ST

Gem Draw Plus 2.01

Sprint 1.0 Broderbund

BUSINESS

Aahton Tate

Fifth Generation
Fastback Plus 2.01
Fox Software
Foxbase + Dev. Sys. 2.10 CAL
Funk Software
Allways 1.085
inword 1.059
Worksheet Utils. 1.0
Smartcom II 3.089
Intuit
Quicken 2.035
Javelin Software
Javelin Plus 2.02249
Lifatree
Volkswriter Deluxe Plus69
Lotus Development
HAL109
Freelance Plus 3.0CAL
Metro 1.1 65
Lotus 1-2-3 2.01CAL
Manuscript 2.0359
MECA
Checkwrite Plus 1.0
Managing Vous Money 5.0 110
Managing Your Money 5.0
Meridian
Carbon Copy Plus 5.0115
Micro Logic
Tomado 1.85
Microivtica
Wordfinder 4.038
Wordlinder 4.03
MicroPro
Wordstar Pro 5.0
Wordstar 2000+ Pers. 3.0259
Microrim
Rbase for DOS 2.1449
Microsoft
Works 1.0599
Excel 2.1CAL
Windows 386 2.1 129
Word 5.0 CAL
Monogram
Dollars & Sense 3.110
7
TaxView Federal (Softview)
Utilizing the power of
Microsoft Windows (run-time
version included) TaxView
simplifies 1988 income tax

preparation. Includes 74 IRS approved schedules & forms — for direct entry and automatic calculation. (Requires 80286/80386, min. DOS 3.0, 640K, HD, mouse & graphics adptr (Business) .. \$69

159.	Clipper (Summ.87)
	Graph In The Box 2
189.	Noio Press
189.	WillMaker 3.035.
	North Edge
	Timeslips III 3.3119.
-	Paperback Software
	VP Expert 2.0 145.
	VP Planner
	Paul Mace
	Mace Gold 1.079.
	Mace Utils. 5.055.
	Parsonica
_	SeeMORE 1.0249.
	SmartNotes 2.049.
	Peter Norton
	Norton Adv. Utils. 4.579.
	Norton Commander 2.045.
	Norton/Inside IBM PC55.
-	
Per Fi	Per:FORM 1.0
er. D	(Deirina Tech.)
William .	Take control of your
The Co	business forms with

Per:FORM 1.0 (Deirina Tech.) Take control of your business forms with

the next generation in form processing soft-ware. True WYSIWYG interface, dropdown menus and powerful screen tools make form design a snap. Multiple font support. Horiz./vert. text. Form-fill plus many other features. Req. 640K & graph. adptr. (Business) \$159.

Norton Advanced Utilities 4.5 (Peter Norton)

All the power and nctionality of the classic standard technical features. functions and enhancements. Includes the new Norton Disk Doctor. The total solution for novice and expert alike. (Business) \$79.





	ı
	ı
	ı
Grandview 1.0	ı
Note-It Plus 1.0249.	Ł
Q & A Write 1.01	Ł
4Word 2.069.	ł
T/Maker	l
ClickArt Business Images42.	ı
	Ł
XTREE Pro. 1.0	Ł
TOPS	ı
NetPrint 2.0119.	Ł
Tops Flashcard	ı
TOPS 2.1119.	Ł
Traveling Software	Ł
LapLink Plus 2.185.	l
WordPerfect Corp.	Ł
WordPerfect 5.0239.	ı
WordPerfect Executive 129.	ı
WordPerfect Office 2.0269.	ı
XYQUEST	ı
XYWrite Plus 3.54239.	П
CAD/CAM	

American Small Bus. Comp. Design CAD 3.1 / 3D each 159. Generic Software Generic Cadd Lv1. 3 w/Dot Plot 135.

DESKTOP PUBLISHING

Adobe

Illustrator - Windows Vers. 399. Aldua Pagemaker 3.0 Software Publishing Pfs First Publisher 2.0



Xarox	
Ventura Publisher 2.0	CAL
EDUCAT	ION &

ENTERTAINMENT	
Accolade	
Grand Prix Circuit*	22
Mean 18*	29
Electronic Arts	
Chuck Yeager's Flight Trainer* Grand Slam Bridge*	32
Grand Slam Bridge*	45
Microprose	
Gunship*	32
Sierra On-Line	
Leisure Suit Larry II*	33
Leisure Suit Larry II* King's Quest IV* (512K)	33

LANGUAGES

oriand international	
urbo C Profess, Pack	16
urbo C 2.0	9
urbo Pascal Profess. Pack	. 16
ore international	
B Fast Compiler	6
Icrosoft	
Compiler 5.1	. 29
uick Basic 4.5	6
uick C 2.0	6
acro Assembler 5.1	9
oter Morton	
orton Editor 1.3	3
MEDIA	
ASF Diskettes (boxed in 10's)	
ASE DISKETTES (DOXED III 10 S)	

1/4" DS/DD (360K) pr	eform
1/2" DS/HD (1.44Mb)	
axeii	
25" MD2-HD (1.2Mb)	
5 DS/DD (720K)	
5 DS/DD (720K)	

BCCESSOPIES

Curtia
Ruby + w/fax modem prot69
Universal System Stand25
Diamond SP1
Computer Toolkit22
interex
CablesCALI
Kensington
Masterpiece Plus 109



Checkwrite Plus 1.0 (Meca) Makes checkwriting and bookkeeping fas-ter than ever. For home or business, this flexible tool brings your financial routine under efficient control. Includes customizing and export features. (Business) \$29.

PowerTree 50 (modem/tel.) Universal Tilt Swivel Printer Muffler 132 DRIVES Seagate 20Mb ST225 Int. w/ctrlr. (65ms) 299. 40Mb ST251-1 Int. (AT/28ms) 449.

MicroWAREHOUSE

Mountain Computer 40Mb Tape Backup Ext. Plus Development Hardcard 20 Mb (49ms) ... Quantum ProDrive 40AT/80 AT Int. 529./859. TEAC

EXPANSION & UPGRADES

Advantage Premium 512K...... Rampage Plus MC 512K CALL Fifth Generation Logical Connection 256K CALL Hercules Color Card CGA 159. Intel Aboveboard 2 Plus 512K 479. Inboard 386/AT (reg. cable) Special 8087/80287/80387 co-proc. CALL Orchid Technologies 339 ProDesigner RAMQuest 16/32 Extra w/0K339 Video 7 Fastwrite VGA w/256K ...



State-of-the-art fast, rugged and reliable 42mb and 84mb 3 1/2" AT hard drives from Quantum, Av. 19ms access time. 1:1 interleave. Includes DisCache and patented AIRLOCK automatic shipping lock. High performance at exceptions prices. (Drives) ProDrive 40AT \$529. ProDrive 80AT \$859.

INPUT DEVICES

Professional Write 2.0 (Software Publishing) Easy-to-use word processor with many sophisticated features. Excellent support for lasers (multiple fonts per age). Integrates with other Pfs software and has powerful import/export unctions. Includes address book and pell checker (Business) \$125.



Vice and Macternard accepted Visa and Mastercaro accepted. Your credit card will not be charged until your order is shipped. Corporate purchase orders subject to credit

approval.
All products are covered by 120 day limited warranty.* CT residents add 7.5% sales tax, N.J. residents add 6% sales tax

Within continental U.S. - \$3.00 per order for U.P.S. ground delivery - except as noted

Orders placed MON-THU for "in-stock" items Orders placed MuN-1HU for im-stock nems ship within 24 hours. It you are more than 2 days away from us by U.P.S. ground, we ship 2nd-day air at no extra cost - except as noted below. C.O.D. order \$1,000 max. Surcharge

UPS ground delivery and actual freight charges apply for computers, hard disks, Bernoulli's, tape back-ups, monitors and

Alaska, Hawaii, outside contine APQ/FPO call for information. *Defective software replaced immediately. Hardware replaced or repaired at our discretion

Item availability and price subject to change without notice. Software is not copy protected, except where

marked by asterisk

CONTEST RULES 1. Entries must be received on or before 6/30/89. 2. Winners selected in random drawings by storneys for Microc Warehouse In-(MWH), whose decisions are final. 3 MeXT Computer prite subject to availability. MWH reserves the right to substitute wholesale cash value up to \$10,000. 4 Winners recash value up to \$10,000. 4 Winners re-sponsible for taxes. 5. Oxds of Winners re-sponsible for taxes. 5. Oxds of Winning depend on number of entries. All prizes will be awarded, 7,218.9 Winners conflicted by mail. Oxabes subject to change at the discretion of MWH. It unable to contact any winner and afternate with be selecta-tered on the contact of the contact of the contact residents, except where prohibited by law. Employees of WwH and suppliers not eligible. 8. Prizes - one MeXT Computer including key-boards and monter and 150 software and media DEC 200

Summagraphics Summasketch Plus

E2HSSMIP

Multisync 2A, 3DCALL Zenith ZCM-1490 14" flat scm.

PRINTERS I RP-8 II Laser Special Citizen 180D.. Okidata Ml. 182 Plus ML 321 ML 390 CALL



Just imagine vourself as the winner of the most powerful personal computer ever built! More RAM, more speed, incomparable CD

quality sound — THE personal computer of the 1990's.
All you have to do is enter the MICRO WAREHOUSE SUPER COMPUTER GIVEAWAY. Your name is automatically entered into the drawing when you order from Micro Warehouse. Or just send in

the official entry coupon. Our helpful telephone staff is standing by, seven days

a week to take your call. I'm Kerry, call me at:

WAVRIER COUSTE

800-367-7080 (1-800-DOS-7080) CIRCLE 129 ON READER SERVICE CARD

Inquiries 201-370-0518 Fax# 201-905-5245 Monday through Friday 8 a.m. to 11 p.m. (Eastern) Saturday and Sunday 8 a.m. to 8 p.m. MICRO WAREHOUSE." 1690 Oak Street.

P.O. Box 1579, Lakewood, N.J. 08701



OFFICIAL ENTRY COUPON 1690 Oak Street P.O. Box 1579 Lake

When you order by phone or mail, you are automatically entered in the drawing. You can also mail this coupon or call our contest entry line 1-800-367-0711,

Addres		4-4
Name		

DOS ON A TERMINAL

If you're interested in running DOS applications on a Unix system, you can choose from three classes of terminals. Here is a brief description of what's available.

In a multiuser Unix system, one lucky user can use the system console (which is compatible with a graphics adapter) and keyboard, while the rest must use terminals—even life they're running DOS applications that can take advantage of graphics facilities. Since most DOS applications will shift down to running on the IBM Monochrome Display Adapter (MDA), in a character-only mode, you'll still be able to run most of them on an ordinary serial terminal that doesn't use a graphics adapter—at the cost of those stunning displays all PC users have come to expect.

If you're going to run DOS applications on a Unix system, you'll have to choose from among three classes of terminals. You should be aware, however, that many terminals can't display the IBM MDA extended character set, which most DOS applications use. Instead, the terminal may require characters from its own character set to be substituted. In addition, because the keyboards don't exactly resemble that of the PC AT, not only will you have to adjust to a new keyboard layout, you'll also have to make sure that your DOS-under-Unix system is flexible enough to provide for keyboard input mapping. And you must be sure that you'll have every possible required keystroke combination available for your DOS application as if you were using a PC keyboard—even if you terminal offers fewer keys.

A WORD FOR THE WYSE Some terminals are designed to mimic the action of the PC keyboard and screen while behaving like standard terminals. An example is the Wyse Technology WY-60, which we tested with a variety of DOS applications. The WY-60's 25-line screen does a very serviceable job of emulating the IBM MDA, so you should have no problem running most spread-sheets, word processors, and databases; most of them run on the MDA.

You won't want to brag about this ter-

minal's display speed, but you should find it adequate for most applications. The 9,600-bit-per-second connection to the host can update the screen in about 2 seconds, but most changes occur faster because only part of the screen is changed.

The WY-60 keyboard looks just like a standard PC keyboard: all the keys are where you would expect them to be, and oddball keystroke combinations such as Ctrl-Alr-SysReq work the way they should. The WY-60 has a list price of \$599.

DEC'S SERIAL APPROACH If you have to use DOS software on an ordinary scrial terminal like Digital Equipment Corp.'s DEC VT-30, which we also tested, you will need to retrain your reflexes. From afar, the keyboard supplied with the VT-330—and with the inexpensive VT-320—looks like an AT keyboard, but up close you'll notice that the legends are different on many keys,

less see some speed degradation, since Unix uses disk storage to augment main memory when the tasks exceed the memory capacity.

Within the VPiix environment, most things work as they would in a standalone DOS system. For example, when you issue the vpix command, the system chugs away briefly, then the screen clears, and you see DOS boot. What appears looks a lot like a warm boot on a running DOS system, and the process takes about as long. At the conclusion, you get a Z:> prompt. At this point you could almost fool your colleagues into thinking that you were running DOS by itself rather than as a job on a Unix system. But most people's first comment would probably be, "Hey, where'd you get a Z: drive?"

VP/ix solves the problem of group access to nonshareable peripherals, such as the floppy disk and the serial ports, by having configuration files. If a user has a personal VPIX.CNF file, then the settings specified there apply; otherwise the settings in a global VPIX.CNF apply. In a multiuser environment, you would usually use VPIX.CNF to restrict access to non-shareable devices in the default VPIX.CNF—and then enable them for certain privileged users in individual files. VP/ix will warn you if a second user starts a session that is configured to access a non-shareable device.

It is disconcerting when you start VPix and first see a warning, for example, that the floppy disk drive cannot be accessed. But I quickly realized that such a warning is better than simply getting the message "General failure accessing drive A" when you try to access the device from within DOS. It is also possible to release a drive in

one session so that it can be picked up by another. This area of VP/ix is more rigid than the corresponding features in the Merge 386 program.

ZE EQUALS C: VP/ic's way of handling the C: drive may surprise you—especially if, like most DOS users, you expect C: to refer to your main hard disk. VP/ich has a C: drive, but many users will never need it, because Z: is the DOS drive ID that corresponds to the Unix file system, where most files are stored. In fact, C: is not a real hard disk but a virtual disk—a file in the Unix file system that has been structured to mimic a DOS disk drive. In this virtual drive are the "hidden" files that DOS uses to boot, and the COMMAND.COM file, plus CONFIG.SYS and AUTOEXEC.BAT.

VP/ir's virtual drive doesn't have a

which means that they aren't where you'd expect them to be.

Using the VT-330 to run DOS software is difficult because many common PC keys require multikey sequences on this keyboard. Most of the key combinations start with the Esc key, so you must strike Esc twice to escape. (Try that keystroke combination in Microsoft Word, where the Esc key is already overloaded with several functions!)

You'll find this terminal a reliable performer once you are used to it. But in the interim, if you're used to a PC keyboard, you're certainly not going to like the readiustment.

Then, too, the VT-330, like many older terminals, can display only 24 lines of text. Standard PC displays show 25 lines of text, all of which are used by DOS applications. You can define a key that will expose the hidden line, but we'd prefer to see the whole screen all the time. The DEC VT-330 costs \$2,038; the VT-320 lists for \$545.

THE ULTIMATE—SUNRIVER If you don't want to compromise and you have the money to spend, you can have it all with SunRiver Copp.'s EGA, EGA Plus, and VGA Plus terminals. Listing for \$1,999, \$2,299, and \$2,499, respectively, these terminals give you a graphics screen, a standard PC keyboard, and a blazing fiber-optic link between your system and the display/keyboard unit.

If it were not for the absence of a floppy disk drive in the system unit, you might be fooled into thinking you were using a standalone PC after you saw this unit's screens and performance. In fact, we found that as demanding a graphics software program as Microsoft Windows ran about as well on the SunRiver terminal as it did on the system constant

Of course, you get what you pay for: the top-of-the-line SunRiver VGA Plus costs more than some complete AT-compatible systems. But going this route is the egalitarian way for a group of people to share a system.—Kaare Christian

fixed size. It is big enough to store a few utilities, but it's not the place to install a major application program.

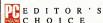
In addition to a default C: drive, each user or group of users can have a personal C: drive. The default C: drive is not writeable by ordinary users, so those who want to manage their own CONFIG.SYS or AUTIOEXEC.BAT will need their own C: drives.

One of the VPiix features that you can access through CONFIG.SYS is EMS memory. The manual warns that you should be stingy in allocating such memory, because using EMS makes each DOS session consume more precious space in the main memory. One VPiix session with a full 2MB EMS allotment takes up about as much memory as three VPiix sessions that don't use EMS.

VP/ix's most obvious weakness is its

very slow EMS implementation. Yes, you can run software that needs EMS, but don't plan to break any speed records: the EMS emulation of VP/ix runs about as fast as EMS on a 4.77-MHz PC, circa 1983.

Most intriguing is VP/ix's support for the SunRiver graphics terminal (except when you are using the Sun 386i). The SunRiver terminal connects to an adapter board in the host computer that supports four EGA or VGA terminal connections. Each of these terminals is, like any ordinary dumb terminal, just a screen and a keyboard that you use to interact with a host computer. But the SunRiver has a number of distinctions; its use of fiberoptic technology to reduce communication time to almost nothing; its emulation of an EGA or VGA adapter, so that you can use graphics programs; its use of a PC keyboard, so that every key is where you ex-



· Ease of use vs. flexibility

There are two situations that require a DOS-under-Unix program: if you're a DOS user and want to bring multiuser and multitasking functionality to that operating system but you also need to use Unix, or if your primary operating system is Unix and you want access to the large base of sophisticated DOS applications.

As we've noted in the introduction to this article, users who adready run a version of the Unix operating system may only be able to consider one of the two products we've reviewed or a variant from a secondary vendor. On the other hand, DOS users who are not committed to a particular version of Unix will find than both Merge 386 and VPiix are good choices, but for different reasons.

Although VP/ix and Merge 386 take similar approaches to creating a DOS-under-Unix environment, they diverge in ease of use and configurability. If you're looking for a DOS-under-Unix program that will get a functional DOS environment up and running with the least amount of effort on your part, look no further than VP/ix. But for environments where flexibility and efficiency are of paramount importance, particularly those burdened by heavy multiuser loads, Merge 386 gets the nod as the stronger product.

pect it to be; and its inclusion of serial and parallel ports, so that you can enhance your DOS graphics environment with local printers, mice, and modems.

SPEED AND COMPATIBILITY The performance of *VP/ix* is clearly adequate, although *Merge 386* is somewhat faster in a number of areas. We tested *VP/ix* run-

DOS UNDER UNIX

ning under 386/ix-Interactive Systems' version of Unix System V, Release 3.0, for 386-based PCs-on a Compaq Deskpro 386/20 with 7MB of memory and a 60MB disk. When you run just one session, VP/ix generally performs close to the speed of native DOS. VP/ix turned in good performance on file I/O operations and excellent performance on computational operations and graphical displays.

VP/ix turned in favorable results on our compatibility tests; in fact, we were able to run all of the DOS programs we tried. Lotus 1-2-3 and Microsoft Flight Simulator worked without a hitch. So did the serial version of the Microsoft Mouse. Microsoft Word worked fine on the console, but when we tried to run it on a serial terminal. the system seemed to think a graphics display was available and accordingly scrambled the console screen. Yes, a program running on a serial terminal was able to demolish the console screen display, in the

process defeating the 386's memory protection features. You can run Word on a serial terminal, but you must explicitly use the /C option to tell Word to use character mode

We encountered one minor difficulty that stems from VP/ix's use of a Z: drive. Some programs, like Microsoft Windows. have no problem working with drive Z:, but others, like DESOview, have a C:centric view of the world. We were able to use DESOview, but its installation program completely gave up after asking a handful of questions about our environment. When we exited DESOview after using it for a long time, the DOS session froze. We weren't able to repeat the problem, so we could not determine whether the difficulty was with DESOview, VP/ix, or the hardware.

Microsoft Windows worked beautifully, both on the console and on the Sun-River terminal. On the console, using the

screen switch to go to or from a graphics session was a sluggish procedure, but the facility worked flawlessly. All of the systems that support VP/ix (except the Sun 386i) also support screen switching on the console, so that you can switch from one console session to another.

There's a lot to like about VP/ix. It ran every DOS program we tried, and it also did well on the PC Labs benchmark tests. both when the machine was supporting just one user and when it was running several heavy background jobs to simulate multiple users. Its support of VGA graphics, EMS, and the SunRiver graphics terminal makes it a good choice for the decade to come

Kaare Christian is a research associate at The Rockefeller University, where he uses both Unix and DOS to build scientific instruments. He is also the author of five books on the Unix operating system.

It's Here Now And It's Going Fast.

Uncompromising Reliability Teams Up With Unparalleled Performance



Dvna 30MHz 80386 Cache System PERFORMANCE BENCHMARKS

-One Step Ahead.



Prices range from \$4.995 to \$24,769

3081 North First St. San Jose, CA 95134 (408) 943-0100

FAX (408) 943-0642

- LANDMARK SPEED TEST (VERSION 4.0) 49MHz NORTON S.I. RATING (VERSION 4.0) 36.3
- ■POWER METER MIPS TEST 8.96 MIPS

HARDWARE FEATURES

- 80386 " CPU (Intel)
- Custom-dasigned 64K RAM cache and controller (Implemented in PALS), nearly s 90 percent calcu-
- One to 24 megabytes of RAM available =80387 and Weitek support (stand-sione or simulta-
- neous mounting)
- Tower enclosure (six half-height or three full-height
- drive enclosures) Monographic, EGA and VGA options available
- MFM, ESDI and SCSI hard drives and controllers
- Drive capacities range from 40 megs bytes to 780
- DOS, UNIX, NetWara, OS/2 and XENIX compatible 10MHz I/O bus speed

the design and manufacture of PC, 8088, 288 and 388

SERVICES:

Reliability is the first thing on your mind and at Dyna nputer we make it our number one priority. Our goal at Dyna Computer is to serve and maintain you, the customer. Dyna Computer fulfills your performance/ throughput requirements by designing today's highest performance Intel-based 80386" microcomputers.

Support and service are next on your agenda and ours.
If your company needs nationwide on-site service or a guaranteed 48-hour depot service contract, we can, in most cases, effectively channel your requirements.

We realize that many corporations need to lease their computers. Dyna Computer equipment is available via lease scheduling for qualified companies

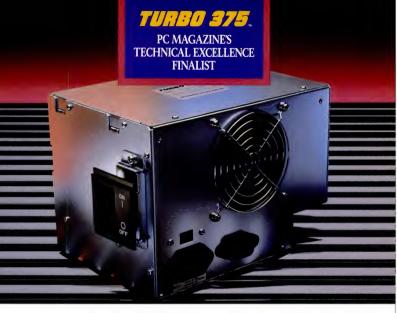
At Dyna Computer, as st most companies, well over 80 percent of our business comes from repeat customers. So for your benefit, Dyna Computer goes out of its way

to make sura that your requirements are met Call one of our highly trained systems sales consultants today. We will prove to you that at Dyns Computer

we make it our business to satisfy your business systems and peripherals requirements.

CIRCLE 379 ON READER SERVICE CARD

ed trademark of Neurol. Inc. NEWER is a registered trademark of the Santa OS-2 is a trademark of ISM 80385 is a trademark of it.



A standard power supply just isn't enough.

rdinary power supplies, like the ones found in off-theshelf PCs, will not meet the demands of today's high-

> performance systems. For serious business applications, you need a power supply that will not skip a best during a hard disk access or when the line voltage sage. One that actually you paid for. One that is engineered for uncompromised performance, reliability, and safety.

More power to you.

The Turbo 375 is the one. It's the most powerful unit available for your AT or Tower computer. In fact, it can run a IOMIPS, 3GB machine! Even if you don't need that kind of muscle, the Turbo 375's wide input range, independent regulation, enhanced cooling, and other premium features insure optimum system reliability.

Complete PC/XT/AT and Compaq power line.

In addition to the Turbo 375, we offer over a dozen power supply models to choose from. They include the ultra-quiet Silencer 14 150/200 series, the high-performance Turbo-Cool 14 150/200/250 series, and a powerful new 250 watt supply designed for the Compaq Deskpro.

Guaranteed to last.

Every product, from our least expensive XT power supply to our topof-the-line Turbo 375, is rigorously tested and backed by an unmatched warranty program.

Call PC Power & Cooling the power supply specialists for complete technical information or to place your order. VISA/MC/COD/PO



PC POWER & COOLING, INC.

31510 Mountain Way, Bonsall, CA 92003

(619) 723-9513 = FAX (619) 723-0075 CIRCLE 473 ON READER SERVICE CARD

PC BRAND Chosen#1 For Customer Service and Support.

"PC BRAND is the LL Bean of the personal computer mail order.

PC BRAND wants no unhappy customers, and it's service and support policies help to insure that."

-Personal Computing's 10 Best Mail Order Companies, Feb, 1989



PC BRAND offers you more...

Welcome to PC Brand. Your first place to shop. Your best place to shop for top quality IBM compatible systems, custom configured to your exact specifications, and thousands of quality name brand peripherals & accessories.

Choose from over 10,000 items in stock... all at unbeatable prices!

Free Freight, Toll-Free Support, 5-Year Warranty and more...

Everyone promises you great service. We deliver the tangibles.

Free freight • Fast delivery
• No credit card surcharges
• A 30-day Money-Back
Guarantee on every system
we sell • Toll-Free Technical
Support that will stay with
you until your questions
are answered and your
problem is solved • And
our exclusive 5-Year Warranty (call for details) on
all PC Brand products.

Call PC Brand today.

For the best selection... the best products...at the best price, you can't do better than PC Brand. Call PC Brand today!

PCBRAND 286/12 \$949



12 MHz Clock, Zero Wait Operation, Norton SI 15.3 •Landmark™ Speed 16MHz 512K, 1.2MB or 1.44MB Drive, 101- Keyboard

Standard System Features:

- 80286 Processor Operating at 12MHz with Zero Wait States delivering 16MHz Effective Throughput
- 512K RAM expandable to 4MB on the System board using 256K and/or 1MB 100ns RAM chips
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive Controller
- . Enhanced 101-key AT Style Keyboard
- · High Capacity System Power supply
- · Real Time Clock/Calendar with 5 Year Battery
- 80287 Co-Processor Support
- Industry Standard BIOS with full MS/DOS, OS/2, XENIX,
- NOVELL, 3COM and PCNET compatibility

 Built-in System Board LIM EMS hardware drivers
- User configurable I/O timing permitting compatible operation
- with older peripherals or faster I/O for newer devices

 8 Slot motherboard design (6 16Bit & 2 8Bit)
- · Small foot print case with 5 Disk Drive bays

Options:

- Compag® Style LCD Portable Tower Case

Standard Pre-Built Configurations:

Video Drives	20MB 1:1 MFM	40MB-40MS 1:1 MFM	40MB-28MS 1:1 MFM	80MB-28MS 1:1 MFM
Mono	\$1335	\$1439	\$1548	\$1679
EGA	\$1729	\$1833	\$1942	\$2073
VGA	\$1900	\$2004	\$2113	\$2244

PC BRAND 286/20 \$1300



20 MHz Clock, Zero Wait Operation Norton SI 20.4 •Landmark™ Speed 25.9MHz 512K, 1.2MB or 1.44MB Drive, 101-Keyboard

Standard System Features:

- 80286 Processor Operating at 20MHz with Zero Wait States in interleave mode delivering 26MHz Effective Throughput
- 512K RAM expandable to 8MB on the System board using 256K and/or 1MB 100ns RAM chips (4MB on motherboard and 4MB on optional special interleaving daughter card)
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive controller
- · Enhanced 101-key AT Style Keyboard
- High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287 Co-Processor Support
- Industry Standard BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM, and PCNET compatibility
- Built-in System Board LIM 4.0 EMS hardware drivers
- User configurable I/O timing permitting compatible operation with older peripherals or faster I/O for newer devices
- 8 Slot motherboard design (6 16Bit & 2 8Bit)
 Medium foot print case with 5 Disk Drive bays
- Medium foot print case with 5 Disk Drive bay.

Options: • 386SX Upgrade • Tower Case • 4MB Interleaving Ram Card

- Custom configurations w/Name Brand peripherals of your choice
- Custom configurations w/Name brand peripherals of your choice
 Compaq® Style LCD Portable Factory Installed RAM Upgrades

Standard Pre-Built Configurations:

286/20 With 512K, Hard Disk Drive, Monitor & Video Card						
Drives Video	40MB-40MS 1:1 MFM	40MB-28MS 1:1 MFM	80MB-28MS 1:1 MFM	110MB-28MS 1:1 RLL	150-16MS 1:1 ESDI	320-16MS 1:1 ESDI
Mono	\$1790	\$1899	\$2030	\$2296	\$3000	\$3923
EGA	\$2184	\$2293	\$2424	\$2690	\$3450	\$4317
VGA	\$2355	\$2464	\$2595	\$2861	\$3700	\$4488

TURN PAGE FOR MORE PC BRAND SYSTEMS...
FOR NAME BRAND PERIPHERALS SEE OUR AD ON FOLLOWING PAGES...

To Order Call 1-800-PC BRAND

(Call 1-800-722-7263...In Illinois, Call 312-226-5200) FAX#312-226-6841

PG Brand, Inc. 994 West Washington Street, Chicago, IL. 66607 1-800-722-7263. We are open Monday thur Priday: 8 am to 6 pm CST. VISA, MasterCard, Discover, Checks, and Approved PO. 5 are Accepted. Prices subject to Change. For Order Status and Customer Service Inquiries Call H-80-66-25EEV



Your Best Choice for Quality Systems Toll-Free Support Toll-Free Service Free Freight 5-Year Warranty



PCV20 AD-II

\$669

15 MHz Throughput in an XT. Complete w/ Monographics Card & Monitor, Norton SI 4.0 512K, 360K Drive, Mono Card & Monitor, 84-Keyboard

Standard System Features:

- . 10MHz Nec V20 CPU with 1.5 times the power of the 8088!
- 512K RAM standard. Expadable to 640KB
- · One 360K Floppy Drive · 84-key AT Style Keyboard
- · 8 Slots, Serial, Parallel, Game Ports, and Clock Standard
- · All Ports and FDC Built into Motherboard for Increased Reliability
- · Hercules Compatible Graphics Card
- 12" Monochrome Monitor
- · Accomodates up to 4 HH Mass Storage devices
- · AT Style Case with Keylock, Turbo, Power and Hard Drive LEDs.
- · Set-up & Operating instructions.

Standard Pre-Built Configurations:

PCV20 AD-II With 512K, Hard Disk Drive, Monitor & Video Card					
Video Drive	1 Floppy	2 Floppy	20MB	30MB	40MB
Mono	\$669	\$740	\$924	\$950	\$1077
RGB	\$839	\$914	\$1098	\$1124	\$1241
EGA	\$1059	\$1134	\$1318	\$1344	\$1461

PC BRAND 386/20 \$1995



20 MHz Clock, Zero Wait Operation Norton SI 24 • Landmark Speed 30MHz 1024K, 1,2MB or 1,44MB Drive, 101-Keyboard

Standard System Features:

- . Intel 80386 Processor Operating at 20MHz with Zero Wait States in
 - interleave mode delivering 30MHz Effective Throughput · 1024K RAM standard expandable to 16MB via 32Bit RAM boards
 - using 256K and/or 1MB 100ns RAM chips · 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
 - · 1:1 Interleaving Dual Hard Drive/Floppy Drive controller
 - · Enhanced 101-key AT Style Keyboard
 - · High Capacity 200 Watt System Power Supply
 - · Real Time Clock/Calendar with 5 Year Battery
 - · 80287 or 80387 Co-Processor Support . Industry Standard BIOS with full MS/DOS, OS/2, XENIX,
 - NOVELL, 3COM and PCNET compatibility · User configurable I/O timing permitting compatible operation
 - with older peripherals or faster I/O for newer devices
 - 8 Slot motherboard design (6 16Bit & 2 8Bit & 2 32Bit)

. Medium foot print case with 5 Disk Drive bays Options:

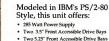
- 32/64KB Cache Processor Weitek Coprocessor Tower Case · Custom configurations w/Name Brand peripherals of your choice
- · Compaq® Style LCD Portable · 8MB 32Bit RAM Card Upgrade

Standard Pre-Built Configuration:

386/20 With 1024K, Hard Disk Drive, Monitor & Video Card						
Drives Video	40MB-40MS 1:1 MFM	40MB-28MS 1:1 MFM	80MB-28MS 1:1 MFM	110-28MS 1:1RLL	150-16MS 1:1ESDI	320-16MS 1:1ESDI
Mono	\$2540	\$2649	\$2780	\$3046	\$3750	\$4673
EGA	\$2934	\$3043	\$3174	\$3440	\$4250	\$5067.
VGA	\$3105	\$3214	\$3345	\$3611	\$4400	\$5238

TOWER STYLE CASE \$220

Add \$220 to any Desktop Configuration



Style, this unit offers: · 285 Watt Power Supply

- Two 3.5" Front Accessible Drive Bays
- Two 5.25" Front Accessible Drive Bays
- One 5.25" FULL SIZE Internal Drive Bay
- TURBO MHz Digital Speed Display
- · Easy Access Snap-off Side Panel for quick
- "no-screwdriver" access to internals

"Tower" is a Registered Trademark for NCR Corporats

PC BRAND 386/25 \$2450



"PC Brand offers the best low cost alternative around"

-PC Magazine's Editors Choice Feb.14, 1989

"Faster Than a Speeding Bullet!"
-Computer Shopper Cover Story Nov, 1988

25 MHz Clock, Zero Wait Operation Norton SI 28.3 • Landmark Speed 35MHz 1024K, 1.2MB or 1.44MB Drive, 101-Keyboard Standard System Features:

 Intel 80386 Processor Operating at 25MHz with Zero Wait States in interleave mode delivering 35MHz Effective Throughput
 1024K RAM standard expandable to 16MB via 32Bit RAM boards

- 1024K RAM standard expandable to 16MB via 32Bit RAM be using 256K and/or 1MB RAM chips
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
 1.1 Interleaving Dual Hard Drive (Florony)
- 1:1 Interleaving Dual Hard Drive/Floppy Drive controller
- Enhanced 101-key AT Style Keyboard
- . High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287 or 80387 Co-Processor Support
- Industry Standard BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM and PCNET compatibility
- User configurable I/O timing permitting compatible operation with older peripherals or faster I/O for newer devices
- 8 Slot motherboard design (6 16Bit & 2 8Bit & 2 32Bit)
- Medium foot print case with 5 Disk Drive bays

Options:

- 32/64KB Cache Processor Weitek Coprocessor Tower Case
 Custom configurations w/Name Brand peripherals of your choice
- Custom configurations w/Name Brand peripherals of your cho
 Compaq® Style LCD Portable 8MB 32Bit RAM Card

Standard Pre-Built Configurations:

Video Drives	40MB-40MS 1:1 MFM	40MB-28MS 1:1 MFM	80MB-28MS 1:1 MFM	110MB-28MS 1:1RLL	150-16MS 1:1ESDI	320-16MS 1:1ESD1
Mono	\$2940	\$3049	\$3180	\$3446	\$4200	\$5073
EGA	\$3334	\$3443	\$3574	\$3840	\$4600	\$5467
VGA	\$3505	\$3614	\$3745	\$4011	\$4800	\$5638

Your PC Brand Advantages:

30-Day Money Back Guarantee
Free Freight
Toll-Free Support
Toll-Free Service
No Credit Card Surcharges
-5-Year Limited Warranty

"As a PC Brand customer, you'll enjoy the best warranty coverage in the industry. Warranty covers all PC Brand system motherbaseds, power supplies, RAM, keyboards and all expansion costs. 100% parts is above are covered your fair year. 9% Parts year-2.0% parts year-3.0% parts year-4.2% parts year-5. Additional eriended coverage contexts variable for a lee Poppy, had disha and type drives are covered for one year only. Manufacturer's warranty applies to all mon-PC Brand products. Complete warranty information available on request.

LCD PORTABLES from

\$1770

286 & 386 Systems •512K,1.2MB Drive, Combo Controller, Backlit Display

*386 Systems come w/1024K.



Select the power & features of our 286 & 386 desktops in a selfcontained, light (20 lbs.) high impact plastic housing similar to the COMPAO® Portable III.

All feature

- 640 x 400 Backlit Supertwist LCD by TOSHIBA
- · Monographic & Color operating modes, EGA Optional
- External Monitor Support. External Keyboard Port.
- 5 expansion slots (3 long, 3 short) 86-key keyboard.
- Accomodates two 5.25" or 3.5" Floppy/Hard Disk Drives
- 200 Watt 112/220 Autoswitch Power
 Serial, Parallel, Game Port, Clock/Calendar Standard

Standard Pre-Built Configuration;

	Portable Sy	stem Processor	and Drive Opt	ions
Drive CPU	286/12	286/20	386/20	386/25
1 Floppy	\$1770	\$2070	\$2650	\$2900
20MB	\$2079	\$2379	\$2959	\$3210
40MB	\$2200	\$2500	\$3100	\$3300
71MB	\$2800	\$3100	\$3600	\$3900
150MB 1:1 EDSI	\$3400	\$3700	\$4250	\$4500

SAVE ON NAME BRAND PERIPHERALS... SEE OUR AD ON FOLLOWING PAGES..

To Order Call 1-800-PC BRAND

(Call 1-800-722-7263...In Illinois, Call 312-226-5200) FAX#312-226-6841



PC Brand, Inc. 954 West Washington Street, Chicago, IL. 60607 1-800-722-7263. We are open Monday thru Friday: 8 am to 6 pm CST. VISA, MasterCard, Discover, Checks, and Approved P.O.s are Accepted. Prices subject to change. For Order Status and Customer Service Inquiries Call: 1-800-662-SERV

Shop PC Brand Today.

THE RESERVE THE PARTY OF THE PA	
LAPTOP COMPUTERS	4 .50
TOSHIBA	
1000; 512K, 80C88, 1 FDD	.\$769
1600 BACKLIT, 80C86-12, 1MG, 20MB HD,FDD	.3175
1200HB; BACKLIT, 1MB, 20MB HD, FDD	
3100E GAS PLASMA 80C86-12, 1MB, 20MB HD, FDD	.2750
3200; EGA, 80286-12, 1MB, 40MB HD, FDD	.3525
5200/40 vga, 80386-20, 2MB, 40MB HD, FDD, _	.5995
NEC	
MULTISPEED HD	2275
ULTRALITE W/1MB	Call
MITSUBISHI	
MP286L-220; 80286, 20MB HDD, FDD \$	2439
Call on New NEC & TOSHIBA Mod	lels

MP286L-220; 80286, 20MB HDD, FDD\$2439 Call on New NEC & TOSHIBA Models
MONITORS*
NEC
Multisync 2A 14" (800x600) EGA VGA .\$499
Multisync GS 14" Mono249
Multisync 3D 14" (1024x768) EGA/VGA659
Multisync Plus 15" (960x720)895
Multisync XL 19" (1024x768)2395
MAGNAVOX
All Magnavox monitors feature 2 Yr. Warranties!
12" Amber TTL Monochrome\$79
14" VGA Paper White Flat Screen 145
13" RGB (640x200) Color230
13" EGA (640x400) Color339
14" VGA (800x600) Color415
PRINCETON GRAPHICS
Max 15 15" Multifreq. Monochrome249
Ultra 16 16" Multifreq. EGA/VGA879
Ultrasync 12" Multifreq. EGA/VGA 520 SEIKO
CM1430 14" (1024x768) Multifreq\$619
CM1420 (noninterlaced) Multifreq 1079 MITSUBISHI
XC-1410 14" EGA (640x350)\$369
1381 Diamond Scan
3905 19" CAD Monitor1965
6905 19" CAD Monitor2285
SONY
CPD1302 13" Multiscan (1024 x 768)645 CPD1320 13" (640 x 480) VGA
ZENITH (640 x 480) VGACall
1490 Flatscreen Enhanced\$600
1470 FlatScreen Ennanced\$600

NEC 14"Mu	ltisync IIA
800x600 Resolution	Super VGA Monitor
	2000
-	\$499
	Freight Free!

MODEMS	274
PC BRAND 100% Hayes Compatible!	64

PC BRAND 100% Hayes Compatible!
1200 Baud Internal w/Bitcom\$49
1200 Baud External70
2400 Baud Internal w/Bitcom89
2400 Baud External129
HAYES
1200 External\$270
2400 External415
A.T.I.
2400ETC Internal Modem w/MNP5 165
US ROBOTICS
Courier HST/9600\$599
Courier V.32 9600 Baud Ext.w/MNP5 889

Internal Modems



EGA Wonder VGA Wonder



VIDEO CARDS	19
PC BRAND	
Mono Graphics w/Printer Port	\$55
Color Graphics w/Printer Port	49
EGA (640x480) Autoswitch	149
VGA	220
PARADISE	
Autoswitch 480 EGA	\$177
VGA+	
VGA+ 16 16 Bit Version NEW	309
VGA Professional	465
VIDEO SEVEN	
VEGA DELUXE	\$209
VEGA VGA	268
FASTWRITE VGA	379
VRAM VGA	475
NEC	
1024-256	\$1175
MVA 1024	949
ATI	

DISK DRIVES

FLOPPY DISK DRIVES: 360K 5.25" HH Black 720K 3.5" HH w/5.25" Mounting80 1.2MB 5.25" HH Grey 1.44MB 3.5"HH Grey w/5.25" Mounting 95 PS/2 FLOPPY DRIVES CMS 5.25" 360K/PS/2 Ext.Floppy\$199

MINISCRIBE 3180E

150MB 1/2 HT. C 16MS ESDI

Largest Capacity, Highest Performing Half Height Drive on the Market!

20MB 65MS ST225 w/XT Controller ... \$259

HARD DISK DRIVES: SEAGATE

20MB 35MS ST125 w/XT Controller 299
20MB 35MS ST125245
30MB 65MS ST238 w/XT Controller 285
30MB 35MS ST138310
30MB 35MS ST138 w/XT Controller 355
40MB 40MS ST251350
40MB 28MS ST251-1409
80MB 28MS ST4096 Full Height590
MINISCRIBE
40MB 61/40MS M3650\$319
40MB 25MS M3053455
63MB 61/40MS M3675 RLL349
71MB 22MS M3085659
71MB 28MS M6085 Full Height559
110MB 22MS M3128 RLL 1/2 Height 699
150MB 16MS M3180E ESDI 1/2 Hgt! .1295
320MB 16MS M9380 ESDI FullHeight .1975

45MB 28M5 ID45H Hair Height	
130MB 20MS ID130AT Full Height 13	395
132MB 20MS ID130PS INT. for PS/2 14	
160MB 28MS ID160EC ESDI w/CNTRL 16	
230MB 25MS P230R2 RLL Full Height 14	
330MB 20MS ID330PS INT. for PS/2 18	
330MB 20MS ID330EC ESDI w/CNTRL . 22	250
Below Eutomat and DC /2 Deluce also Assellable	

640MB 16MS M9760 ESDI Full Height 3525

IOMEGA B1201 Single 5.25" 20MB Int.\$795 B220 Dual 5.25" 20MB Ext.1619

If the drive you require is not listed here please contact our sales department for a quote!

TAPE BACKUPS

60MB Archive QIC Internal or Ext \$590	
60MB Maynard Maynstream Portable 889	
60MB Maynard Maynstream for PS/2 889	
68MB Irwin External549	
80MB Irwin Internal509	
150MB Archive Internal925	
150MB Maynard Maynstream Port 1395	
2.2GB Maynard 2200HS 8mm Drive 4350	

Save Time. Save Money.

SCANNERS/DIGITIZERS The Complet PC Handscanner Diamond Flower HS3000 Hand Scan ... 249 300/400DPI 6 Grev Levels HALO DPE Desktop Publisher GEM/HALO/ PC-Paint/Windows File Format Output. Hewlett Packard Scaniet989 Microtek MSF300G Microtek MSF300C Microtek MSF300O w /64 Grev Levels 1850 Princeton LS300 Scanner & Adapter 750 Summasketch 12x12......378 Summasketch 12x18...

PRINTERS*

NEC
P2200 170/55345 P960XL 400/140 1030
P5200 265/90530 P5300 Wide650
LC890 Postscript Laser Printer3190
PANASONIC (New Models Listed)
1180 192/38 \$189 1191 240/48 235
1124 192/63329 1592 220/38390
1595 290/51 449 1524 240/80 545
OKIDATA
ML390 270/90 465 ML391 270/90 645
ML320 300/62 339 ML393 450/120 995
ML321 300/62 479 ML393C 450/120 .1069
HEWLETT PACKARD
Deskjet 690 Laserjet II 1720
Font Cartridges Call MemoryUpgrades Call
Laserjet IID Duplex Laser Printer 2995
TOSHIBA
321SL 216/72 469 341SL Wide Carr . 599
351SX 360/120937 Express 311385
CITIZEN
120D 120/25 149 180D 180/29 170
MSP40 240/40 295 T224 200/132 579
DICONIX

PANASONIC KX-P1124 24 Pin 192CPS Draft 63CPS Letter Quality

\$329

*** : 田田田中

150P 150/50 305 300WP 310/73 479

PC BRAND-YOUR #1 LAN SOURCE!



NOVELL NETWORKING

NOVELENETWORKING
NOVELL
4 User ELS 286 Level 1\$45
8 User ELS Level II93
Advanced Netware 286 V2.15 185
SFT Netware 286 V2.15239
Disc Coprocessor Board37
NE2000 Ethernet File Server Board 39
NE1000 Ethernet Card29
RXNET29
TIARA Lowest Priced Lancards Ca
GATEWAY (PC Magizines Editors Choice)
G/Ethernet AT\$41
G/NET25
WESTERN DIGITAL
Ethercard+A for PS/2\$32
Starcard+23
Ethercard+ w/Novell Drivers23
STANDARD MICRO
ARCNET Passive Hub\$7
ARCNET Active Hub40
PC120 ARCNET BOARD Now EGA compat 13
PC260 TWISTED PAIR ARCNET CARD 13 PC500-WS 16 Bit Work Station Board38
PC500-FS 16 Bit File Server Board 47
1 COO 10 10 DR 1 MC Server Dourd

I/O CARDS

Commence A fragment of the property of the first of the first of the contract	
AST Rampage 286 w/512K	395
INTEL Aboveboard Plus w/512K	419
INTEL Inboard 386 for PC w/IMB	799
INTEL Inboard 386 AT	1019
DIGIBOARD Smart 8 Port Serial Card .	Call
PC BRAND	
I/O+II For AT's Ser/Par/Game	\$45
I/O+II For XT's Ser/Par/Game/Clo	ck 45
2MB EEMS for XT's w/0K LIMS 4.0	95
2MB EEMS for AT's w/0K LIMS 4.0	95
3MR Multifunction+Memory for AT	e 110

PC BRAND

Free Freight 30-Day Money-Back Guarantee Toll-Free Service and Support

No Credit Card Surcharges

We carry over 10,000 different name brand roducts, Call for prices on products not listed

FAX MACHINES/CARDS

SHARP FO220989	FO4201299
QUADRAM	
JT FAX 4800 265	JT FAX 9600549
MURATA	M1600879
TOSHIBA	M1600879
	TSH301001225
COMPLETE PC	
4800B FAY 249	9600R FAY 399

SERIAL MOUSE



DIOTTEDE

IDOIIDRO	
CALCOMP	
1023\$3800	10427499
10436499	1044 10200
HOUSTON INSTRI	UMENTS
DMP41, DMP42, DM	IP52Call
DMP52MP, DMP61,	DMP62Call
ROLAND	
DXY885, DXY990, D	PX2000Call
*Onessized Mouitons	Lacor Drintone Loutone

and Plotters are excluded from free freight.

To Order Call 1-800-PC BR

Serial/Par/Game/Software w/OK

(Call 1-800-722-7263...In Illinois, Call 312-226-5200) FAX#312-226-6841



Mother Nature Can Teach Us A Lot About Hard Disks.

It can happen with no warning. The sky goes dark and then it's there. A whirling funnel that destroys everything in its path, leaving little or nothing that can be retrieved. Just the way that disaster can strike your hard disk, scattering your data to the wind.

Virtually nothing is safe from a tornado, but fortunately there is a way to protect your hard disk data from a crash.

It's called FASTBACK PLUS. And though you can find cheaper programs, you won't find a better one, at any price.

With FASTBACK PULS, daily incremental backups can take as little as a minute a day. In fact, backing up a full 10 megabytes on your hard disk takes only about 4 minutes.* And that makes FASTBACK PULS the world's fastest backup program.

And now, with version 2.0, there are more features than ever. While supporting DOS 3½ or 5¼ inch floppies, it simultaneously reads your hard disk as it writes data to floppies, tape, cartridges or any other logical DOS device. With data compression, it cuts the number of backup disks in half. Plus, there's a unique "restore estimate" feature that tells you what disks to use, and warns you if there isn't enough room left on your hard disk. And version 2.0 is easier than ever to use. So easy, and so fast, you actually will use it. Every day. And that's the whole point. But you

don't have a minute to lose. Your hard disk may be brewing up a storm right now. Protect it with FASTBACK PLUS, before it's too late.

A Minute A Day Keeps Disaster Away





With PC AT or equivalent,

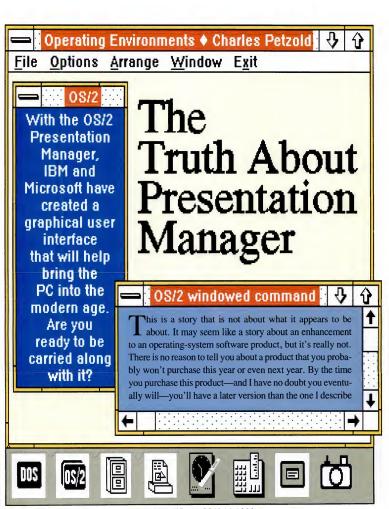
Edward R. Degginger/Bruce Coleman Inc.-N.Y.

Fifth Generation Systems, Inc. 11200 Industriplex Blyd. Baton Rouge, IA 70809

(800) 873-4384, (504) 291-7221.
This product is in no way associated with or has origination in Fisher Scientific or Allied Corporation.

Users of versions prior to Fastback Plus V2.0 can call (504) 291-7681 for upgrade information.

CIRCLE 286 ON READER SERVICE CARD



■ PRESENTATION MANAGER

here. Some things I say in this article may no longer be true. Other things will be very obvious to you.

This story is really about the future of PC application software, the applications that you'll be using for much of the next decade. These applications will probably be written for, and will run under, the OS/2 Presentation Manager.

Like all operating systems, OS/2 is meaningless in itself. The support of application programs is its primary function. OS/2 is a relatively new operating system. and the Presentation Manager (included for the first time in OS/2 1.1) is newer still. Obviously, most applications for the Presentation Manager have not yet been written or even conceived

When these applications become available, I think you'll discover that they are better than what you're using now. They will be easy to learn but at the same time very powerful; visually attractive but also visually interactive; fun to use yet designed for serious work.

Making possible this new generation of PC application software is what the OS/2 Presentation Manager is all about.

A GUI FOR OS/2 The Presentation Manager is a graphical user interface (or GUI) for OS/2. Many concepts of the GUI were originally developed at Xerox's Palo Alto Research Center (PARC) and first successfully brought to small computers with the Apple Macintosh. The GUI has come to be regarded as the state of the art in user interfaces and will probably be common on computers (both small and large) produced over much of the next decade.

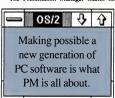
Typically a GUI displays multiple programs in separate windows on the screen. Users can move these windows around, resize them, and easily switch among the programs. The programs have a consistent user interface that makes use of pull-down menus, dialog boxes, and graphical objects such as scroll bars and buttons.

Programs running under a GUI use graphics for all screen output. This makes possible the display of text in different fonts and sizes, as well as the easy integration and manipulation of text and graphics. The use of graphics results in a richer and denser information content than is possible in character mode.

Graphical user interfaces commonly support a secondary user-input device, most often a mouse. The mouse provides an easy way for the user to switch among programs, manipulate windows, and indicate program options.

Users generally find a graphical user interface easy to learn. The GUI establishes a consistency in the user interface that allows knowledge of one application to carry over into the next. Ease of operation becomes increasingly more important as the use of PCs extends to less-sophisticated and more-casual users. Of course, power users also benefit. If the basic functions of a program are trivial to learn, more time can be spent on the more-difficult features (such as macro languages).

The Presentation Manager makes its



debut in OS/2 1.1. Its absence from OS/2 1.0 (released in December 1987 and discussed in "OS/2: A New Beginning for PC Applications," PC Magazine, April 12, 1988) may indicate that the Presentation Manager has been "tacked on" to the base operating system. But it's more accurate to see the Presentation Manager as an integral part of OS/2. In this sense, OS/2 1.1 is the first real version of OS/2, while OS/2 1.0 was an unfinished interim product. The Presentation Manager is the primary application environment of OS/2. The future applications that come to characterize the operating system will be written for the Presentation Manager environment.

OS/2 is being developed by IBM and Microsoft working under a joint development agreement. Both companies always intended for the new operating system to support some type of multitasking windowing environment, but at first they did not see eye to eye on the form this interface

would take. The Presentation Manager is a result of negotiation, collaboration, and a merging of software technologies.

STRANGE BEDFELLOWS Like politics, the computer industry sometimes makes strange bedfellows. It's hard to imagine two companies more different than IBM and Microsoft, and harder still to believe that any codevelopment between these two industry giants could work at all, let alone yield a worthwhile product. But in a classic example of synergy, the Presentation Manager turned out to be superior to anything either company could have created by itself.

IBM (bigger than Microsoft) got to name the product. "Presentation Manager" is a pretty klunky name all right, but that's IBM. The Presentation Manager includes a sophisticated vector-graphics programming interface, one of the most powerful graphics systems ever brought to a personal computer. And that's IBM, too.

Much of the windowing and user interface technology in Presentation Manager comes from Microsoft Windows, a DOS operating environment that Microsoft introduced in 1985. The graphics system in Presentation Manager includes some raster graphics and bitmap support (in addition to the IBM vector graphics technology) that also comes from Microsoft Windows.

In software technology, the Presentation Manager combines the best that IBM and Microsoft have to offer. The involvement of both companies in the product is also beneficial for more-practical reasons. Although Microsoft has succeeded in making Windows a GUI standard for DOS, this has been a long and laborious process. The endorsement of IBM helps ensure that OS/2 and the Presentation Manager will become industry standards more quickly.

But IBM could not have done it alone. In recent years IBM, working by itself, has had great difficulty establishing standards in either software (witness TOPView. IBM's nongraphical windowing environment) or hardware (the Micro Channel architecture of the PS/2). Fear that IBM wants to move to proprietary hardware and operating systems inhibits industry acceptance of anything from IBM that is not built with the concept of open architecture.

The involvement of Microsoft helps to establish OSZ as an industry standard rather than an IBM proprietary product. Microsoft will be licensing OSZ and the Presentation Manager to other hardware manufacturers that will adapt it to their own hardware.

IBM's version of OS/2 1.1 was released on the last day of October 1988. Other hardware manufacturers are expected to follow with their versions of OS/2 1.1 during 1989.

APPLICATIONS ON THE HORIZON

Of course, it makes little sense for most users to consider moving from DOS to OS/2 until a sufficient number of Presentation Manager applications become available. Some applications are expected this year, but OS/2 probably won't become viable for most users until 1990 or 1991.

Some of the early Presentation Manageerrograms will be applications now available for Windows. These include Al-dus's PageMaker and Microsoft Excel (two programs originally developed for the Apple Macintosh) and several CAD products from Micrografx, including Designer. The Presentation Manager versions of these programs will probably show better performance than the Windows versions owing to increased memory space, better memory management, and more-efficient multitasking under OS/2.

Microtim and Oracle have both demonstrated early versions of Presentation Manager database products, and Ashton-Tate plans a Presentation Manager version of dBASE. In the spreadsheet arena, Lotus Development Corp. plans to introduce 1-2-3/G, a Presentation Manager version of the best-selling spreadsheet program. It will have some competition from Microsoft Excel, as well as Presentation Manager versions of Borland's Quattro and Computer Associates's Super-Cates.

Word processing, too, reaps benefits from a graphical user interface by gaining a true WYSIWYG display. Although Microsoft and WordPerfect have not officially announced plans for the Presentation Manager, it's quite likely that both companies are working on something. Presentation Manager versions of MultiMate, DisplayWrite, and WordStar are also expected.

The first company to release a Presentation Manager application is Borland International, with SideKick for Presentation Manager. Although the program was not available at press time, demonstrations of this new SideKick have been very impressive. It is quite different from the old program and introduces some powerful features. For example, the calculator 'paper tage' is actually a one-column spread-sheet that can be edited (with changes rippling through the calculation), saved, and retrieved. The phone directory creates a Parandox database

The role of Borland in developing the first commercially available Presentation Manager application is significant: historically, Borland has been a strong critic of Microsoft Windows. But like many other



companies, Borland apparently sees the Presentation Manager as the environment that will support future PC software.

HARDWARE REQUIREMENTS The hardware necessary to run the OS/2 Presentation Manager has been the subject of much confusion and misinformation. I will try not to add to this confusion, but I think it would be helpful to make a distinction between "minimum" and "practical" requirements. The minimum requirements are what you need to run OS/2 1.1 with no regard to performance, whereas the practical requirements are what you need to achieve adequate performance, operational ease, and reasonable video display fidelity. The minimum requirements to run OS/2 1.1 are an 80286- or 80386-based personal computer with 1MB of memory, a graphics video board and display, and a 10MB hard disk.

IBM's version of OS/2 1.1 supports all

its 80286- and 80386-based PCs (the PC AT, the XT Model 286, and PS/2 Models 50 and above). Other vendors' versions of OS/2 1.1 will support their 80286- and 80386-based machines. Obviously, OS/2 will run better on a high-speed 80386 machine than on a low-speed 80286. But so will most other software.

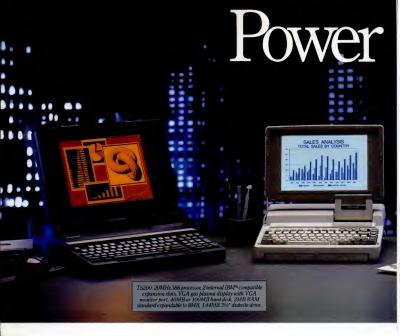
The IMB minimum memory requirement is probably the lowest OS/2 memory requirement you've ever seen, but it's no misprint. OS/2 will boot and run in IMB and will even allow a 256K DOS compatibility mode. I've done it, and it works.

Running OS/2 1.1 under 1MB of memory is equivalent to living in an apartment with 3 by 6 feet of floor space and a large closet. You may not be comfortable, but you could keep most of your possessions in the closet and take out only what you need at any one time. In this analogy, the large closet is your hard disk. OS/2 implements virtual memory, which means that if it needs more memory than is physically available, it will use hard disk space to temporarily store data in memory. When this data is needed again, OS/2 will save something else in memory on the hard disk and swap in what it needs. Only when the hard disk fills up will OS/2 applications actually run out of memory.

While OS/2 1.1 may run under IMB, performance is intolerable. IBM recommends a more practical requirement for the operating system: 2MB with another 512K if a DOS compatibility mode is used. But 4MB offers a more comfortable environment for the operating system and a couple of applications running concurrently.

Beyond this, estimations of practical memory requirements get a little tricky. It depends on the size of the applications you run, how many you have loaded at the same time, and what performance degradation you are willing to tolerate.

The performance problems will occur mostly in switching among programs. When a program has been loaded into memory but is not doing anything, OS/2 can discard the program's code segments and swap its data segments to disk. The program then takes up very little memory. But when you switch to the program to use it, the code and data segments must be reloaded. This results in a disk access. If you want to keep several large programs load want to keep several large programs load.



At Toshiba, we're not only committed to making computers more portable, but also to making portables more powerful.

Which is why, in our effort to constantly improve and refine our machines, we've added three new computers to what is already the most complete family of truly portables available.

Each designed to be powerful enough to take on the increasingly complex tasks that face today's sophisticated PC users.

First, the T1600 which weighs under 12 pounds and which is the fastest battery-

powered computer we've ever made.

Second, the T3100e, the successor to our most popular machine—the T3100/20. We've made it nearly two pounds lighter and

a lot faster—we've even added expansion capabilities. About the only thing we didn't add was more size.

more size.

T1600: Battery-powered 286/12MHz, coprocessor socket, 20MB hard disk at

coprocessor socket, 20MB hard disk at 27msec, 1.44MB 3½" diskette drive, 1MB RAM expandable to 5MB, detachable backlit EGA compatible LCD, removable rechargeable battery pack.



Toshiba is the world leader in truly portable PCs and manufactures a complete line of high quality dot-matrix and laser printers. For more information call 1-800-4577777. All Toshiba PCs are backed by the Exceptional Care program tone cost enrulinent required. IBM is a registered trademark of international Business Machines Corporation. Model T2500 has not been approved by the Federal Communications Commission. This device is not, and may not be collected for sale or lesse, or sold or least entitle the approval of FCC has been obtained.



And finally, the T5200, which has enough power to replace virtually any desktop PC.

But we haven't just concentrated on power and portability. We've also constantly looked for ways to make our machines more durable, more reliable, and easier to use—down to the 800 number our customers can call for help with any technical question that might come up.

We figure that's what our users demand. And it's by anticipating the growing needs of our users that we have continually found ways to make our machines weigh less and do more. So you can work wherever you want and however you want.

All of which might make it tempting

for some people to abandon their desktop for the convenience of portability. Go ahead. We've given you

the power to do it.

T3100e: 12MHz 286 with 80287 coprocessor socket, internal half-length IBM slot, 20MB hard disk with 27 msec access, 1MB RAM expandable to 5MB, gas plasma display, 1.44MB 3½* diskette drive.



In Touch with Tomorrow

Toshiba America Inc., Information Systems Division CIRCLE 321 ON READER SERVICE CARD

11 ON READER SERVICE CARD

ed and you won't tolerate any disk access when switching among them (and if RAM prices drop to a reasonable level), you'll want at least another couple of megabytes.

People will run OS/2 with various amounts of memory depending on the applications they run, their work habits, the performance they want from the system, and the thickness of their wallets. Systems will range from 3MB on up, probably averaging in the 6 to 8MB region a few years from now.

This may sound like a lot, but it's following a normal trend. In 1980, before the IBM PC was introduced, 64K was normal on CP/M machines. By 1985, PC users were butting up against the 640K memory limit of the PC architecture. Six megabytes for 1990 is right in line.

The initial release of IBM's OS/2 1.1 has graphics device drivers for the Enhanced Graphics Adapter (EGA), Video Graphics Array (VGA), and the IBM 8514/A. Color Graphics Adapter (CGA) support is expected in a set of device drivers that IBM is scheduled to distribute at the end of February 1989. (The IBM monochrome board is not capable of graphics and thus cannot be used with the Presentation Manager.)

In time, manufacturers of other video boards are expected to develop and distribute their own device drivers for Presentation Manager, just as they do today for Microsoff Windows. From the perspective of application programs, the Presentation Manager has a device-independent graphics interface. If a device driver is available for a particular video display adapter, all programs written for the Presentation Manager can use it without any changes.

The CGA (black-and-white with 640by 200-pixel resolution) is the minimum requirement for a Presentation Manager video board. But the practical requirement is an EGA, with 640 by 350 resolution and 16 colors. Higher on the scale is a VGA, increasing the resolution to 640 by 480.

Because the Presentation Manager works with graphics, performance will be improved by video boards with hardwareassisted drawing. The first such board with a Presentation Manager driver is the IBM 8514/A (1,024- by 768-pixel resolution with 256 colors). This is not the last word in video adapter technology.



Figure 1: When OS/2 1.1 boots from the hard disk, it switches the display to a graphics mode and loads several programs. The Start Programs window in the center of the screen allows you to choose a program to run. The icons at the bottom of the screen represent the DOS compatibility session, the Printer Spooler Oueue Manager, and the Task Manager.

For a hard disk, the minimum requirement is IOMB. But OS/2 1.1 itself occupies 8MB of hard disk space, and you'll want to reserve a couple of megabytes for disk swapping, so this is a real minimum and leaves no room for applications! A practical requirement would depend on the size of the applications you'll be using. A 30 or 40MB hard disk will be fine for many users, but 80 to 120MB would be safer.

You'll also want a mouse for the Presentation Manager. While the system has a complete keyboard interface (and mos) Presentation Manager programs will also), a mouse certainly adds to the ease of use.

Another desirable hardware option is a printer capable of graphics. As with video boards, the device-independent graphics interface of the Presentation Manager will allow all Presentation Manager programs to use a printer for which a device driver is available. The initial release of OS/2 1.1 included only one device driver that supports the IBM Proprinters I and II, but this deficiency is obviously only temporary. For example, a PostScript driver for the Presentation Manager is expected soon.

FIRST ENCOUNTERS Assuming that OS/2 1.1 is the current version when you decide to move from DOS to OS/2 (which will probably not be the case), here's what you'll find when you open the box and install the system.

The IBM OS/2 1.1 package consists of five high-density diskettes and one binder containing several manuals. The package

is available with either 5¼-inch diskettes (for the IBM PC AT and the XT Model 286) or 3½-inch diskettes (for the IBM PS/2 Models 50 and above). The documentation includes a 159-page Getting Started manual, a 281-page Using the System manual, a 176-page Command Reference, and a 54-page System Editor manual (covering a new full-screen text editor).

Installation of OS/2 1.1 on a hard disk is fairly easy. You boot up the installation diskette and follow the instructions. This takes about 20 minutes. Most files on the distribution diskettes are in a packed format, so it would be difficult to install OS/2.1 without the installation program. The installation program is upon thard disk, copies files from the diskettes, and unpacks the files.

After the installation you can boot OS/2 1.1 from your hard disk. Midwy through the boot process, the screen switches to a graphics mode. A window and several icons appear, as shown in Figure 1. This is the Presentation Manager session.

The program in the center of the screen is labeled Start Programs. This window lists the programs currently installed to run under OS/2. You can run one of these by moving the reverse-video highlight with the keyboard and pressing Enter, or by using a mouse to double-cike (pressing the mouse button twice in succession) the program you want to run.

The programs installed on the Start Programs window are organized in "groups." Start Programs initially displays the Main Group, but you can switch to the Utility Programs Group from the menu. The menu also lets you add and delete groups and add and delete installed programs within a group.

The Main Group includes two items labeled "OS/2 full-screen command prompt" and "OS/2 windowed command prompt." These start up the OS/2 CMD.EXE program (the equivalent of COMMAND.COM in DOS) for entering OS/2 commands or running OS/2 programs from the command line prompt. You can run CMD.EXE in either a separate full-screen character-mode session (as in OS/2 1.0) or in a text window in the Presentation Manager session. Figure 2 shows several copies of CMD.EXE running in different windows.

As is the case with CMD.EXE, most programs written for OS/2 1.0 can be run in their own full-screen sessions or in text windows in the Presentation Manager session. OS/2 1.0 programs cannot take advantage of Presentation Manager graphics and other aspects of the user interface. Programs prohibited from running in a text window are those that write directly to video display memory and those that install monitors or subsystems.

Using either the keyboard or the mouse, you can switch among windows, move or resize windows, "maximize" a window to fill the whole screen, "minimize" a window to be displayed as a small icon, or "close" the window (which terminates the program).

The icon at the lower right corner of the screen is the Task Manager. You can display the Task Manager window at any time by pressing Ctrl-Esc. (If you're currently in a character-mode session, OS/2 will switch to the Presentation Manager session when you press Ctrl-Esc.) Within the Presentation Manager session, you can also enable the Task Manager by double-clicking the icon with the mouse.

The Task Manager displays the names of all currently running programs, as shown in Figure 3. You can switch to one of these programs by using either the keyboard or the mouse. For a program running in a character-mode session, OS/2 will switch to that session. For programs in the Presentation Manager session, the program that you switch to will be moved to

the top of all the other windows.

The icon at the lower left corner of the screen is labeled DOS. Double-clicking this icon with the mouse (or selecting "DOS command prompt" from the Task Manager) switches to the full-screen DOS compatibility mode session, which you can use for running most DOS programs. The remaining icon displays a little image of a printer. This is the OS/2 print spooler program. Its window lists all print jobs currently queued or being printed.

Three other Presentation Manager programs are included with OS/2 1.1 and can be run from the Start Programs window. Introducing OS/2 is a short tutorial that takes you through the basics of the interface. The Control Panel (listed in the Utility Programs group) lets you set the system date and time, change system defaults (such as the screen colors), and install printer drivers and font files.

The File System (shown in Figure 4) is the most sophisticated Presentation Manager program included in OS/2 1.1. This program displays a directory tree and lets you open multiple directory windows that list the files in the directory. Menu commands let you perform the equivalents of many OS/2 file commands. Some file operations can be performed without help from the menu. For example, you can move files from one directory to another by opening two directory windows, selecting the files you want to move, and then dragging the files with the mouse to the destination directory window.

At almost any time, help is available by pressing F1. Help windows display text in the default Presentation Manager font, an easy-to-read, proportionally spaced Helvetica. A help window from the File System is shown in Figure 5.

Although the programs included in OS/2 1.1 are functional and do what they're supposed to do, some of them-in particular, Start Programs, Task Manager, File System, and Control Panel-are not quite ready for prime time. They are certainly not shining examples of what can be done in the Presentation Manager and still need some work before they function in a truly natural and intuitive fashion.

For example, the Task Manager and Start Programs windows, which perform completely different functions, look very

similar and often list some of the same programs, which makes them easy to confuse. The installation of printers in the Control Panel is a total disaster. The File Manager has some good ideas, but I get frustrated every time I try to use it.

The initial release of OS/2 1.1 also lacks some essential pieces, such as graphics printer drivers for anything except the IBM Proprinters I and II. (As of this writing, some additional printer drivers for IBM printers are expected from IBM shortly.) Microsoft is working to get printer drivers written for non-IBM printers, but it is still not clear to me how these drivers will be distributed.

For most users, these problems are irrelevant. The deficiencies are so obvious that I'm sure everyone at Microsoft and IBM knows of them. By the time most users get their hands on the Presentation Manager, these programs will be fixed.

What is much more important, of course, is the Presentation Manager API (application program interface). This is what programmers must work with to write applications for the Presentation Manager.

THE PROGRAMMER'S VIEW The primary purpose of the OS/2 Presentation Manager is to provide a platform for applications written specifically to its API. While most users will not encounter the Presentation Manager until these programs are written, programmers must look at the Presentation Manager much earlier. Obviously, the applications that they write will determine how users will eventually encounter the Presentation Manager.

Programmers approaching the Presentation Manager API as their first graphical user interface will find a system that is very big, initially confusing, and conceptually difficult. The API is big because it adds about 500 function calls to OS/2. These are divided almost equally between the two main components of the system: the windowing and user interface component, and the Graphics Programming Interface

The Presentation Manager API is initially confusing and difficult because, like most graphical user interfaces, it is based on an "event-driven" or "message-driven" model. This differs considerably from

Last minute taxes?

□ 31/2"	format available from ua. Specify
when	ordering.
nack	age includes both 51/4" and 31/2"

- dlaks. ■ 31/2" format available from manufacturer
- B 31/2" format available from manufacturer by request. Call us for details.
- CP—copy-protected; NCP—not copy-protected.

SOFTWARE

We only carry the latest versions of products. Version numbers in our ads are current at press time.

Aldus NCP	
□PageMaker 3.0	C
Alpha Software NCP	
AlphaWorks 1.0 (integrated package)	11
□ALPHA/three 1.0 (dB3 file compatible)	21



Epson ... 1 year FX-050 Pnnter-Feature laden 136 column, 9 pin dot-marrix printer. Smart-park mode loads single sheets without removing continuous form paper. Prints 264 cps draft (12 cpi mode) and 54 cps letter quality (12 cpi mode) ... call

American Small Business Computers	
□Design CAD 3.1 (NCP)	15
Design CAD 3D 1.1 (NCP)	
Application Techniques NCP	
Pizazz Plus 1.2	7
Ashton-Tate NCP	
□dBASE IV 1.0	C
MultiMate Advantage II 1.0	
Autodesk	23
□Autosketch Standard 1.04	. 5
Barron's CP	
RISAT (Test preparation program)	. 3
Best Programs NCP	
□Label Master 3.1 (mailing label program).	. 2
Bible Research NCP	
☐The Word 4.2 (King James version)	159
□The Word 4.2 (New International version).	
Bioc Publishing NCP	
□FormTool 2.01	5
□Form Filler 1.5	



Broderbund ... CP

||drijptinr-Choose among three different
fighting aircraft—an F:14 Tomcat, F:16 Fighting
Falcon, or FIA-18 Hornet. Encounter Soviet
Mig aircraft. Over 30 missions are included;
supports land or carrier-based attacks... \$35.

9.	supports and of carrier oased attacks: 11. 400	•
3		
П	□Personal Lawyer 2.0	38
н	Borland International NCP	32
н	Borland International NCP	
П	ESuperkey 1.1	
П	El Turbo C 2.0	99
ш	Turbo C Professional Pack (w/Debugger)	69
H	RTurbo Pascal 5.0	99
1	■Turbo Pascal Professional Pack	
н		169
1	EProlog 2.0	99
l.	R Turbo Assembler & Debugger 1.0	99
н		135
н		135
н	EQuattro 1.0 w/SQZ!Plus 1.0	165
ш		ca
н		179
Ł	Bourbaki NCP	
1	□1DIR+3.0	49
н	Bridgeway Publishing NCP	
н	□FastTrax 3.9	35
J.	Broderbund CP	
	□Print Shop 2.41 (incl. Graphics Library 1)	39
	Memory Mate 3.01R (NCP)	45
9.	Chipsoft NCP	
9.	■ TurboTax Personal/1040 6.01	
_	EState Packages Personal/1040 6.0 each	32
5.	Chronos Software NCP	
	HWho•What•When (people, projects, time)	119
all	Core International NCP	
9.	□Corefast 2.0	95
_	Crosstalk Communications NCP	
5.	□Remote ² 1.01	95
_	Crosstalk XVI 3.7	
5.	□Crosstalk MK.4 1.1	24
_	Dac Software NCP	
9.	Dac-Easy Payroll 3.0	
_	Dac-Easy Light 1.0	45
9.	Dac-Easy Accounting 3.0	59
9.	Datastorm NCP	40
_	□Procomm Plus 1.1B	49
5.	Deirina Technology NCP	
9.	Per:FORM 1.0	59

5th Generation NCP
● Fastback Plus 2.01\$109.
Fox Software NCP
R Foxbase Plus 2.1 (single user) 209.
Funk Software NCP
□Sideways 3.21 (creates wide printouts) 42.
• Worksheet Utlities 1.0 (1-2-3 utilities) 59.
□Allways 1.0
General information NCP
Hot Line Two 2.0 49.
Generic Software NCP
■Generic CADD Level 2 (now includes
DeskConvert and Pen Plot) 89.
■Generic CADD Level 3 (now includes
Dot Plot and DeskConvert) 179.
 Estimator
□Basic Home Design 3.0
□CADD Starter Kit (Includes Level 2) 119.
Great American Software NCP
□One Write Plus Master 2.01 (General Ledger). 129.
□AP, AR, or Payroll 2.01 each 129.
Harvard Associates NCP
RPC Logo 3.0
Hayes NCP
■Smartcom II 3.0
Hilgraeve Software NCP
□HyperACCESS 3.31
Individual Software NCP
■ Typing Instructor Encore 2.13 26.
□Professor DOS 2.51 (with Smartguide) 27.
Intuit NCP
Quicken 2.0
Javelin NCP
RJavelin Plus 2.02
Lifetree NCP
UVolkswriter 4
Lotus NCP
Symphony 2.0
□Symphony 2.0
□Freelance Plus 3.0



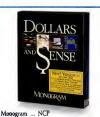
NorthEdge Software ... NCP

| Timeshps Ill 3.3—Turns time into money for your service business with its accurate software timer, custom billing system, powerful productivity analysis and accounts receivable reports ... \$169.

For IBM Personal Computers exclusively.

IPE-CONNECTIONI

game that relaxes?



Dollars & Sense 3.1-Unscramble your nest egg and meet your tax deadline with this program's powerful money management abilities . . \$105.

	_
MECA NCP	
Checkwrite Plus 1.0.	. 29
	119
Andrew Tobias' Tax Cut 1040	. 49
Meridian Technology NCP	
□CarbonCopy Plus 5.0 (2 required)	115
Micro Logic NCP	
□Tornado 1.8	. 55
Microlytics NCP	
□GOfer 1.0 (text retrieval system)	. 45
□Wordfinder 4.0 (electronic thesaurus)	. 35
MicroPro NCP	
□WordStar Professional Release 5	259
Microrim NCP	
R:BASE for DOS (version 2.1)	449
Microsoft NCP	
□Learning DOS 2.0 (for any DOS version) .	. 35
□Windows 286 2.1	
□Works 1.05	
■Windows 386 2.1	129
■Word 5.0	ca
Excel 2.1 (requires 80286/80386 CPU)	239
LANGUAGES	
□Quick BASIC 4.5	69
□Quick C 2.0	69
Macro Assembler 5.1	. 99
Basic Compiler 6.0	
■C Compiler 5.1	299
Monogram NCP	
Dollars and Sense 3.1 (w/Tax Advantage).	105
Nantucket Software NCP	
Clipper (Summer '87, dB3 Plus compiler)	429
New England Software NCP	
Graph-in-the-Box Release 2	. 75
□GB-Stat 1.0	159
■GB Analytic 1.0	105
Noio Press NCP	
□WillMaker 3.0	. 35
NorthEdge Software NCP	
Owl International NCP	169
Owi International NCP	

Paperback Software NCP	
□VP-Info 1.4	\$6
□VP-Planner Plus 2.0	145
□VP-Expert 2.0	145
Paul Mace NCP	
□Nvelope 1.02	2
□HTest—HFormat 2.0	4
□Mace Utilities 5.0 (DOS utilities)	5
□Mace Gold 1.0	7
PC Support Group NCP	
□Lightning 4.82	3
□Lucid 3-D 2.0	7
Personics NCP	
□SmartNotes 2.0	4
□SeeMORE 1.02	49
□Look&Link 1.01	59
Ultravision 1.1	79
Peter Norton NCP	
Norton Editor 1.3	3
Norton Commander 2.0	4
Advanced Utilities 4.5	75
ADan Bricklin's Demo Program 2	9
Quarterdeck NCP	
□Expanded Memory Manager 4.2	39
DESQView 2.2	79
□DESQView 386 1.0	115
Reference Software NCP	
□Grammatik III 1.07 (electronic proofreader)	5
□Reference File 1.0 (pop-up DB manager)	49
Relay Communications	
□Relay Gold 3.0	149
Revolution Software NCP	
■VGA Dimmer 2.01 (screen saver)	19
Cruise Control 3.02	39



Nolo Press NCP	
□WillMaker 3.0-Prepare your own valid Last Will and Testament without a Lawyer. Follows a simple question and answer format, and allows you to update your will whenever necessary\$35.	

1-800/243-8088

MMC	PC Conn	ection	590\
MICHAEL COUNCE	6 Mill S	treet	590
	Marlow, NI	1 03456	5900
SALES 60	3/446-7721	FAX 603/4	46-7791

	Rightsoft NCP	
5.	□Rightwriter 3.0	\$54
5.	Simon & Schuster NCP	
5.	□Typing Tutor IV	. 33
	Softlogic Solutions NCP	
Э.	□Software Carousel 2.02	49
Э.	Disk Optimizer 4.01 (w/Data Guardian)	
5.	●FATCAT 1.0	
9.	SoftView NCP	
	□TaxView (for 1988 taxes)	69
Э.	Software Publishing NCP	
5.	Professional Plan 1.01	. 59
	□PFS:First Publisher 2.0	
9.		
	■PFS:First Choice 3.01	
	Professional Write 2.0	
9.	■ Professional File 2.0	
	Office Writer 6.0	
9	■Harvard Graphics 2.12	
	Harvard Graphics Accessories Pack	
9.		



Microsoft ... NCP ■ Word 5.0—New version of Word includes streamlined interface for creating better documents with less effort. Mix text, graphics, and spreadsheet data easily. "Print Preview" displays them exactly as they will appear on

Spinnaker NCP	
Resume Kit 1.0	25.
Splash 1.0	9.
Pinstripe Presenter 1.0	15.
Springboard NCP	
Newsroom Pro 1.0	15.
Certificate Maker	34.
Symantec NCP	
ISQZ!Plus 1.11	39.
Q & A Write 1.01	35.
Grandview 1.0	
Q & A 3.0 (database, word processor) 23	35.
Breakthrough Timeline 3.0 39	95.
Spreadsheet Analyst 2.5 9	
Think Tank 2.4NP	35.
T/Maker NCP	
Scrapbook + 1.0	19.
IClickArt Business Images 4	12.
IEPS (PostScript) Illustrations	79 .
The XTREE Co NCP	
XTREE Pro 1.1	39.

For IBM Personal Computers exclusively.

A board to send faxes?

Electronic Arts ... CP (reqs. graphics brd.)



Great American Software ... NCP □ One Write Plus 2.01—Top-rated accounting package written especially for small business. Easy set-up and operation makes sending invoices and making payments a breeze. Reports monitor cash flow and profit. . \$129.

TOPS NCP	
Flashcard (Apple Talk network card;	
1 year warranty)	169
NetPrint 2.0 (share printers)	. 119
TOPS 2.0	. 119
TOPS Repeater (extends network)	132
Traveling Software NCP	
Battery Watch 1.0 (31/2" only)	. 27
LapLink Mac 2.0 (Mac-PC transfer)	. 79
LapLink Plus 2.1	. 85
ViewLink 1.0 (first product to link all your	
existing software programs and data)	. 95
DeskLink 2.21	. 99
True BASIC, Inc NCP	
True BASIC 2.1 (now includes Runtime)	. 57
I3-D Graphics.	. 45
Vericomp NCP	
SoftBytes 2.0	. 35
WordPerfect Corp NCP	
WordPerfect Library 2.0	. 69
WordPerfect 5.0	239
WordPerfect Office 2.0	269
WordPerfect Executive	129
Wordtech NCP	
DBXL 1.2	119.
Xerox NCP	
Ventura Publisher 2.0	. call
XYQUEST NCP	
XyWrite III Plus 3.54 w/A-la-Carte Menus .	239.
RECREATIONAL/EDUCATION	
RECREATIONAL/EDUCATION	AL

Accolade ... CP (reqs. graphics brd.)

HITAIODAII (Dasebaii Simulation)	11.	JUGOID RUSH
Testdrive (driving simulation)	22.	Spectrum Holobyte NCP
#Jack Nicklaus' 18 Greatest Holes		
BIGrand Prix	22.	■ Tetris (addicting mind teaser)
Broderbund CP		Falcon (F-16 simulation, regs. gra
MWhere in the World is Carmen SanDiego? .	25.	Stone & Assoc NCP (regs.
MWhere in the USA is Carmen SanDiego?	25.	BMemory Master (ages 2 to 6)
MWhere in Europe is Carmen SanDiego?	29.	■My Letters, Numbers, Words (2 to)
□JetFighter (by Velocity)	35.	□2nd Math (ages 7 to 16)

@Chessmaster 2100	33 5.	
■Earl Weaver Baseball	32.	
Life and Death (from Software Toolworks)	35.	
Wasteland	39.	
■Skate or Die!		
Microprose CP		
□F-19 Stealth Fighter (requires CGA or EGA)	39.	
□F-15 Strike Eagle (requires CGA)		
Microsoft NCP		
□Flight Simulator 3.0 (regs. graphics brd.)	35.	
Mindscape CP		
□Gauntlet	29.	
RPaperboy		
□Colony 1.0		
Balance of Power 1990		
One Step Software NCP		
Golf Doctor 1.1 (improve your game)	33.	
Golf's Best Pinehurst #2 4.0 (play the best).	12.	
Golf Statkeeper 1.0		
(includes USGA Handicapper)	27.	



Software Publishing ... NCP Professional File 2.0—Provides direct access to dBASE and 1-2-3 data along with file lookup and data validation. The only flat file database which lets you create custom applications

without programming \$189.
Parior Software CP
Bridge Parlor 2.3
Sierra On-Line CP
(All require Hercules, CGA or EGA)
Leisure Suit Larry
Leisure Suit Larry II
Space Quest II
King's Quest IV (512k version)
King's Quest IV (256k version)
Manhunter
Police Quest
Police Quest II
Gold Rush
Spectrum Holobyte NCP
GATO (submarine simulation)
Tetris (addicting mind teaser) 24.
Falcon (F-16 simulation, regs. graphics brd.) 32.
Stone & Assoc NCP (regs. graph. brd.)
Memory Master (ages 2 to 6) 22.
Mul often Number Mords (2 to 6)

	Sublogic NCP
	□Jet 2.1 (requires EGA or CGA) \$33
	□Scenery Disks each 15
	□Up Periscope
	True BASIC, inc NCP
	RKemeny/Kurtz Math Series
	XOR NCP
ı.	□NFL Challenge 2.0 69.
i	
	HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.

AST Research 2 years
I/O Mini 2 C/S/P
SixPakPlus 64k C/S/P (upgrades to 576k) 129.
Advantage Premium 512k S/P 429.
RAMpage Plus 286 512k (for XT286/AT) 539.
RAMpage Plus MicroChannel 512k 539.
Compucable 2 years
2-Position switch box
3-Position switch box
Cuesta 1 year
Datasaver 400 Watt
(standby power backup) 459.
Curtis lifetime
Curtis Clip CC-1 6.
Disk Holder DB-1 (holds 50 51/4" disks) 8.
31/2" Disk Holder DB-2 (holds up 40 disks) . 8.
Printer Stand PS-1 18.
Smartmodem-to-PC Cable EC-7 (9 feet) 17.
Printer-to-IBM cable EC-6 (9 feet) 17.
Filtered SafeStrip SPF-3
Emerald SP-2
Ruby SPF-2
(6 outlets; EMI/RFI filtered; 6 ft cord) 55.
Ruby-Plus SPF-2 Plus
(w/FAX & modern protection) 69.
, or a more on protocolory



Revolution Software ... NCP Cruise Control 3.02-Boost cursor speed. Stop VGA Dimmer 2.01—Screen saver for VGA. EGA, CGA, Hercules, Mono 19.

For IBM Personal Computers exclusively

Or connect you to Macs?

DCA 1 year	
rma 2 (3270 emulation board) \$729	3
rma 2 Micro Channel	Э.
Epson 1 year	
We are an authorized Epson Service Center.	
FX-850 (80 col., 264 cps, 9 pin) ca	ıll
FX-1050 (136 col., 264 cps, 9 pin) ca	
LQ-500 (w/\$25 rebate coupon) 295	5.
LQ-850 printer (w/\$50 rebate coupon) ca	
Q-1050 printer (w/\$100 rebate coupon) ca	ill
Q-2550 printer (136 col., 400 cps, 24 pin) ca	
X-800 printer (80 col., 180 cps, 9 pin) 179	
Printer-to-IBM cable (6 feet)	
Everex 1 year	•
1200 Baud Internal Modem 79	۵
2400 Baud Internal Modem	
5th Generation 1 year	•
Logical Connection 256k 479	
Logical Connection 512k	
Logical Confiection Stak	,



and the second s
Hayes 2 years
Personal Modem 1200 (with Smartcom EZ;
1 yr. wrty thru PC Connection) special
Smartmodern 1200 289.
Smartmodem 1200B (with Smartcom II) 289.
Smartmodern 1200B (hardware only) 259.
Smartmodem 2400 429.
Smartmodem 2400B (with Smartcom II) . 429.
Smartmodern 2400B (hardware only) 399.
Hercules 2 years
Graphics Card Plus 189.
Intel 5 years
2400B Modem (internal modem) 239.
2400B Modem 2 (internal modem for
PS/2 Models 50/60/80) 269.
Inboard 386/PC w/1 Meg 599.
Inboard 386/PC Piggyback 4 Meg 1249.
Inboard 386/AT (req. installation kit)
Inboard Installation Kit (specify computer) 139.
Above Board Plus 512k 419.
Above Board 2 Plus 512k
Above Board Plus I/O 512k 469.
Connection Coprocessor
OUTHOUSEDIT OUPHOODSOIT



Epson ... 1 year

LX-800 Printer—A fast (180 cps draft—12 cps mode)
and affordable 80 column, 9 pin dot-matrix
printer. Includes tractor feed and Epson's
standard 1 year warranty. Great for home use
or as second office printer ... \$179.

2400 B
2400 Baud Modem for Connection
Coprocessor
Visual Edge (improve the output of your HP
Laserjet II)
MATH COPROCESSORS
8087 (for IBM-PC & XT) 95.
8087-2 (8 MHz, for PS/2 Models 25 & 30) 139.
80287 (for AT & XT286)
80287-8 (for 8 MHz 80286 machines) 219.
80287-10 (for PS/2 Models 50 & 60) 259.
80387 (for 16 MHz PS/2 Model 80) 399.
80387-20 (for 20 MHz PS/2 Model 80) 459.
Kensington Microware 1 year
Masterpiece94.
Masterpiece Plus
Key tronic 3 years
101 Keyboard
101 Plus Keyboard (enhanced layout) 99.
Kraft 5 years
Three-button Joystick
High Speed Joystick Adapter Card 25.
KYE International lifetime
Dyna Mouse GM6+ (w/Dr. Halo III) 54.
Logitech lifetime
Series 2 Mouse (for PS/2 50/60/70/80) 65.
HiREZ Mouse (bus only)
Mouse w/Paint Show (bus or serial) 95.
ClearCase Mouse (serial only) 99.
ScanMan (hand held scanner) 219.
Magnavox 2 years
14" VGA Monitor (9CMO62) 389.
VGA Adapter (9AV610) 249.
14" VGA Monitor (9CMO82) 449.
14" Hi-Res Monitor (9CMO53) 369.
1-800/243-8088
1-000/240-0000

MMC	PC Connection	590V
MARKET SECONDS	6 Mill Street	590N
	Marlow, NH 03456	590C
SALES 60	03/446-7721 FAX 603	/446-7791

Microsoft ... 2 years Mach 20 (1 yr. wrty.) Mouse with Paintbrush (bus or serial). . . . 109. Mouse with Easy CAD (bus or serial) 125. MSC Technologies ... lifetime OmniMouse (serial only; 1 year warranty). . 49. PC Mouse II w/PC Paint+ (bus or serial). . . 89. PC Mouse II w/Autosketch (bus or serial) . 105. NEC ... 2 years Multisync II (800 x 560 max. resolution) . . 599. Orchid Technologies ... 2 years Tiny Turbo 286 (accelerator board). 289. ProDesigner VGA (800x600 VGA Mode) . 319. PC Power & Cooling Systems ... 1 year REPLACEMENT POWER SUPPLIES Turbo Cool 150 (run 25° - 40° cooler). . . . 129. Turbo Cool 250 (run 25° - 30° cooler) . . . 169 Silencer 150 (84% noise reduction) 115. Silencer 200 (69% noise reduction) 149 Turbo Cool 375 . . . Practical Peripherals ... 5 years 1200 Baud Internal Modem (w/PROCOMM) 69. 1200 Baud External Modern (mini)..... 79. Microbuffer Inline (par. print buffer/32k) 135. 2400 Baud Internal Modem 159 2400 Baud External Modem 189 Princeton Graphics ... 1 year Ultrasync (supports CGA, EGA, VGA) ... 549. Max15 Monochrome Monitor 269. Safe Power Systems ... 2 years Safe 250W (standby power backup). . . . 249. Safe 425W (standby power backup). . . . 369 Safe 500W (standby power backup). Safe 1200W (standby power backup). . . . 869. Targus ... lifetime Nylon Laptop carrying case................................... 49.



Leather Laptop carrying case 129.

TheComplete PC ... 1 year

TheComplete Hand Scanner 400. 169

TheComplete Answering Machine. 239. TheComplete FAX 4800 279.

Stone & Associates ... NCP

\[
\triangle 2nd Math (Ages 7 to 16) -- Interactive tutorials that "teach," and six fun activities cover beginning addition through decimals, percents, fractions—even pre-algebra.
\[
\text{tractions—even pre-algebra.} \]
\[
\text{tractions—for pre-algebra.} \]
\[
\text{tractions—for CGA}... \text{27}...
\]

For IBM Personal Computers exclusively.

P&-connection

We'll get you on track!

T3100E Laptop (80286, 12MHz, 20 Meg) call 13200 Laptop (80286, 12 MHz, 40 Meg) call 7588 RAM Card for 11000 299, Video 7 5 years VEGA Deluxe (supports 640x480) 219, VEGA VGA (supports full VGA specs) 287. FastWirle VGA (800x50 max. resolution) 379, VRAM VGA (1024x768 max. resolution) 379	
DRIVES	
Allen duran	
Alloy 1 year Tape System/2 (for PS/2 MicroChannel) 299.	
Retriever/40 (for IBM AT & compatibles) 349.	
IOMEGA 1 year	
Bernoulli II Single 20 Meg Internal (51/4") . 767.	
Bernoulli II Dual 20 Meg External (51/4"). 1659.	
20 Meg Cartridge (51/4")	
20 Meg Tripak (51/4")	
PC2 Card	
PC2B Card (bootable card for PC/XT/AT) . 229.	
PC4 Card (for PS/2 Model 50/60/70/80) 299.	
Mountain Computer 1 year	
40 Meg Internal Tape Drive (XT, AT or PS/2) 379.	
40 Meg External Tape Drive (XT, AT or PS/2) 479.	
40 Meg External Tape Drive w/Power	
Supply (XT, AT, or PS/2)	
Plus Development 2 years	
Hardcard 20 Meg (49 ms) 549.	
Hardcard 40 Meg (28 ms) 699.	

T1000 Laptop (80C88, 6.4 lbs., 5 hr battery) ... call

FREE PCTV® Hard Drive Installation Tape with	
the purchase of 20, 30 or 40 Meg Seagate	
drive for the IBM PC (not for AT). Specify Beta	
or VHS.	
20 Meg Internal Hard Drive ST225	
(w/controller and cables, 65 ms) 299.	
30 Meg Internal Hard Drive ST238	

(w/controller and cables, 65 ms) 329.

Seagate ... 1 year



Kensington ... 1 year
Massurpuce Plus—Provides complete surge
protection for your entire computer system.
Newly redesigned case features recessed
switches, static pad, and low voltage indicator.
Includes five outlets as well as modem
protection ... \$109.

40 Meg Internal HD ST251 for AT(40 ms) \$399
40 Meg Internal HD ST251 for XT
(w/controller and cables, 40 ms) 449
40 Meg Internal HD ST251-1 for AT
(28 ms)
30 Meg Internal HD ST4096 for AT
(28 ms)
TEAC 1 year
PC, XT 360k Drive (51/4" half-height) 79
720k Drive (31/2" half-height, specify XT
or AT)
1.44 Meg Drive for XT (3½" half-height) 99
1.44 Meg Drive for AT (31/2" half-height,
includes Bastech software utilities) 119
Toshiba 1 year
AT 360k Drive (51/4" half-height)
AT 1.2 Meg Drive (51/4" half-height) 99
AT 1.44 Meg Drive (31/2" half-height,
includes Bastech software utilities) 119



Practical Peripherals ... 5 years 2400B Modem—100% Hayes compatible, 2400 baud ½ card modem. Made in the U.S.A. Features automatic adaptive equalization, resulting in fewer transmission errors. Includes PROCOMM software. ... \$159.

DISKS

All disks have a lifetime warranty.	
51/4" DS/DD Disks for PC & XT (360k)	
Fuji MD2D (10 disks per box)	
Sony (10 disks per box)	
Maxell MD2-D (10 disks per box)	13.
Verbatim Datalife (10 disks per box)	13.
51/4" DS/High Density Disks for AT (1.2 M	
Fuji MD2HD (10 disks per box)	
Sony (10 disks per box)	23.
Maxell MD2-HD (10 disks per box)	
Verbatim Datalife (10 disks per box)	22.
31/2" DS/DD Diskettes (720k)	
Sony (10 disks per box)	19.
Fuji (10 disks per box)	19.
Verbatim (10 disks per box)	19.
Maxell (10 disks per box)	20.
31/2" DS/High-Density Diskettes (1.44 Me	eg)
Sony (10 disks per box)	55.
Fuji (10 disks per box)	55.
Maxell (10 disks per box)	



MISCELLANEOUS

CompuServe	
CompuServe Information Service	24.
Cables lifetime	
Smartmodem-to-AT cable (9 feet)	15.
Parallel Printer cable (15 feet)	

OUR POLICY

- We accept VISA and MASTERCARD only.
- No surcharge added for credit card orders.
 Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax.
 All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped 1st Class Mail, charged by weight.
- Upon receipt and approval, personal and company checks now clear the same day for immediate shipment of your order.
- COD max. \$1000. Cash, cashier's check, or money order.
- 120 day limited warranty on all products.*
- 120 day limited warranty on all products.
 To order, call us Monday through Friday 9:00 to 9:00,
 - or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday through Friday 9:00 to 5:30.

SHIPPING

Note: Accounts on net terms pay actual shipping. Continental US:

 For monitors, printers, Bernouli Boxes, computers, and hard drives, pay actual charges. Call for UPS

- 2nd-Day & Next-Day-Air.

 For all other items, add \$3 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.
- Hawali:

 For monitors, printers, Bernoulli Boxes, and computers, actual UPS Blue charge will be added. For all other
- items, add \$3 per order.

 Alaska and outside Continental US:
- Call 603/446-3383 for information.

For IBM Personal Computers exclusively.

IPG-CONNECTION



PC Change.

A kinder and gentler mutation.

pring is a time of transformation here in the mutable metropolis of Marlow, NH (pop.558). First our snow- and ice-covered back roads turn into treacherous trails of mud, virtually overnight. Next, the local teenagers begin walking around with suspicious looks on their faces. But you really know that spring has sprung when our sprilely mascots take off their downfilled parkas, flannel shirts, and countless layers of thermal underwear and begin to rornp with reckless abandon in the sunlight. Look out!

Go with the flow.

(Or, why the water's no longer over the dam.)

À lot's changed around here since we first began selling products for the PC in 1982. Back then, our warehouse was in a closet, orders were filled by hand, and the dam on the nearby Ashuelot River was badly in need of repair. But even though we now have a much larger warehouse, the most sophisticated order processing system in micro mail order, and one of the most solid dams in New Hampshire, we're still country boys, girls, (and animals) at heart.

In spite of all our technological provess, the parking lot still isn't paved, we're still surrounded by acres of forest, and our idea of a power lunch is using the microwave to heat up soup. Which means that the people you talk to when you call us tend to be a little finendlier, a little more laid back, and a little more patient than your average bear.

Get in your licks!

The most magnificent Marlow miracle of all is still the annual metamorphosis of maple sap into maple syrup—a

change that can make everybody's life a whole lot sweeter. A pint of this famous nectar, featuring the mascot who never waffles, is yours free with any order of \$500 or more between now and May 31st.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit, please call ahead.



The pot is definitely sweeter with a pint of our pure New Hampshire maple syrup. Offer not available to

For IBM Personal Computers exclusively.

- --:::=-::-:

■ PRESENTATION MANAGER



Figure 2: Most OS/2 character-mode programs can be run in "text windows" in the Presentation Manager session. Here, several copies of CMD.EXE (the OS/2 command processor similar to COMMAND.COM in DOS) are running in separate windows.

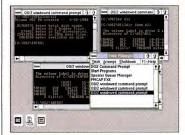


Figure 3: The Task Manager displays a list of all programs currently running under OS/2. You can switch to a program by moving the reverse-video cursor to the name of the program and pressing Enter. or by double-clicking the program name with the mouse.

the "top-down" model that most pro-Programmers experienced with Wingrammers are accustomed to, and it redows have a head start. They will find quires some mental reorientation. The remuch familiar territory in the Presentation lationship between a Presentation Manager API. The APIs of the two sys-Manager program and the operating systems are similarly structured, but they diftem is simply not the same as (and is signiffer in nearly all the details, particularly in icantly more complex than) the prothe graphics language. The big distinction gram/operating system relationship in between Windows and the Presentation more conventional environments. Manager is that Windows is an add-on to



89 file(s) (2464 kilobytes) of 89. 2012 kilobytes free

File Options Tree Arrange Window Exit Oirectory Tree

as copying and deleting files) from the File System menu.



Figure 5: The programs included in OS/2 1.1 display help windows when you press F1. The text uses an easy-to-read proportionally spaced Helvetica font. The buttons at the bottom are used to display an index of the help information and a list of special keys.

DOS (which inhibited some software manufacturers from considering a Windows product), while the Presentation Manager is an integral part of OS/2.

Programmers acquainted with other GUIs (such as the Apple Macintosh, GEM, or the Unix X Window system) will also find some familiar concepts, but many new ones as well. The Presentation Manager and Windows go further than most GUIs in implementing a more object-oriented environment.

When a Presentation Manager program first begins execution, it performs some necessary initialization (in particular, creating a window for the program) and then remains dormant while awaiting messages from the operating system. These messages inform the program of significant events. Some messages signal user input from the keyboard and the mouse. Other messages come from the program's menu or other user interface objects such as scroll bars. The program also receives a message when the user has resized the program's window or when part of the surface of the program's window has to be updated. Working with this message-driven structure is a significant hurdle for the programmer.

I suspect it will take a couple of years for programmers to become suitably famil-

iar with OS/2 and the Presentation Manager to begin exploiting its full potential. (This delay is normal. For example, although the very first version of DOS released in 1981 could support RAM-resident programs, commercial products using this technique did not become prevalent until 1984.)

With experience, the Presentation Manager API reveals itself to be extraordinary, well crafted, and elegant. For most tasks that a program must perform, the API maintains a careful balance between ease, power, and versatility. Overall, it is perhaps the best API ever implemented for a graphical user interface environment. GPI, in particular, is a very powerful graphics programming tool.

There are a few minor flaws in the API. of course, but that's to be expected. In real life, perfection is rarely achieved. The API also lacks a few helpful high-level items, such as multiline edit controls (supported under Windows) and a standardized File Open dialog box (which the Macintosh has).

THE BASE OPERATING SYSTEM Because the Presentation Manager is part of OS/2, programs written for the Presentation Manager benefit from the strength of the base operating system.

OS/2 uses the protected-mode operation of the 80286 and 80386 microprocessors to make available a 16MB physical address space. The implementation of virtual memory also allows each application to use much more memory than is physically available.

OS/2 is a multitasking operating system, obviously an important feature for a graphical user interface that can run several programs at once. Unlike that of Microsoft Windows, OS/2's multitasking is preemptive and priority-based. OS/2 also has other operating-system support necessary

With 3Ms new formatted diskettes you never have to stop

■ PRESENTATION MANAGER

for multitasking, such as file sharing and protection, and semaphores that help coordinate access of resources by multiple applications.

OS/2 programs can themselves take advantage of OS/2's multitasking by creating multiple threads of execution, each of which can run concurrently. It turns out that multiple threads are particularly useful in a graphical user interface. The messaging architecture of the Presentation Manager sometimes inhibits normal preemptive multitasking because all messages related to user input must be serialized (processed one after another, or nonconcurrently). Programs can get around this limitation by creating additional threads of execution that carry out work independently of the messaging architecture. This results in a much smoother and more efficient overall operation of the system.

INTERPROCESS COMMUNICATION One particular strength of OS/2 1.0 was

the support of various types of interprocess communication (IPC). These include shared memory, system semaphores, Unix-style pipes, and queues.

OS/2 1.1 adds three more forms of IPC to this collection. First, "named pipes" are now a part of the base operating system rather than only part of Microsoft's LAN Manager. While named pipes are the most important form of IPC over a local area network, they may also be used by programs running on the same machine.

The second form of new interprocess communication is the Presentation Manager clipboard. This is a form of shared memory that assists in cut-and-paste operations between programs. Under user control, a program can copy data in a specific format to the clipboard, and other programs (or the same program) can retrieve this data and paste it into its document file.

Dynamic Data Exchange (DDE) is a form of interprocess communication originally developed for Microsoft Windows that is also supported under the Presentation Manager. DDE is based on the messaging architecture of the Presentation Manager. It allows programs to send out requests for information from other programs (perhaps even programs that the requester is not familiar with) and receive this information through messages.

THE CONSISTENT USER INTERFACE The Presentation Manager establishes (but does not impose) a consistent user interface for programs. All the logic that imple-

ments menus, dialog boxes, buttons, scroll hars and so forth is built into the Presentation Manager. All menus in Presentation Manager programs function the same way because they use this common code.

If Windows is any indication, programmers who write applications for the Presentation Manager will go further by styling their programs' menus on those of existing programs. For example, many programs (such as word processors. spreadsheets, and so forth) work with files. The recommended practice in Windows and the Presentation Manager is to name the first item on the program's menu "File." This option invokes a pull-down menu with an Open option that displays a dialog box to open a new file. The keystrokes Alt-F-O will always invoke a dialog box to open a file regardless of the pro-

Although some people fear that this consistent user interface will cause application programs to become overly similar and bland, this has not been the case in Macintosh or Windows software. What actually happens is quite different: the Presentation Manager takes care of the more mundane aspects of the user interface. leaving the programmer free to spend more time where it really counts.

DEVICE-INDEPENDENT GRAPHICS

DOS is so weak on even text output that many programmers ignore the operating system and the ROM BIOS and write output directly to the screen. For graphics, writing directly to the screen is nearly a necessity. Over the years this has caused problems, since programs must struggle to keep up to date with emerging graphics standards

The situation with printers is even worse. Most DOS word processing programs these days come with one or two diskettes filled with nothing but small files, each one for a particular printer.

Presentation Manager's device-independent graphics system, GPI, makes this collection of files no longer necessary. Presentation Manager programs use GPI for all text and graphics output. Device drivers take care of translating the graphics to a narticular output device.

GPI is largely derived from IBM's Graphics Data Display Manager (GDDM) mainframe graphics system, with some extensions inherited from Windows. Quite simply, GPI is the most sophisticated and powerful graphics system available for small computers (with the possible exception of Display PostScript). GPI goes far beyond the graphics systems in other popular windowing environments, such as the Windows Graphics Device Interface (GDI), Macintosh QuickDraw, and the Unix X Window system, and even beyond more dedicated graphics programming languages such as the two-dimensional implementation of the Graphical Kernel System (GKS).

Here are a few features for graphics aficionados: GPI supports both image-based and vector-based fonts; a variety of curved lines (ellipses, Bezier splines, and quadratic interpolations); a hierarchy of coordinate spaces with matrix transforms between them; rectangular and arbitrary nonrectangular clipping; PostScript-style paths (used for filling, clipping, or thick stroking with ends and joins); alternate and winding area fill modes; all 256 possible raster operations for displaying a bitmap combined with a pattern on a surface; color





Edition 1.1 IBM Corp. Contact your local authorized IBM dealer. List Price: \$340 (free upgrade from OS/2, Ver-

compatibility session is used), 8MB available hard disk space, IBM 80286- or 80386-based personal computer, 1BM graphics adapter

In Short: OS/2 1.1 includes the Presentation Manager, a graphical user interface with a powerful and well-designed API. However, the OS/2 1.1 package is marred by some design flaws, rough edges, and unfinished business in the included programs. Not copy pro-

CIRCLE 423 ON READER SERVICE CARD

table (palette) support; retention of graphics drawing orders in segments; and metafiles that retain the current graphics state as well as drawing and attribute commands.

That such a rich graphics system is included in OS/2—and available to every program that uses the Presentation Manager API—is still, to my mind, astonishing.

LAURELS AND ADMONITIONS People who enthuse about the direction that

ple who enthuse about the direction that IBM and Microsoft have taken with OS/2 (and I am obviously one of these people) see the Presentation Manager as a important evolutionary step for the industry that has grown up around the IBM PC. As a successor to DOS and a competitor of everything from the Apple Macintosh to Sun workstations, OS/2 and the Presentation Manager must help bring the PC into the modern age.

Most important, IBM and Microsoft have done a really fine job with the Presen-

tation Manager API. This is obviously the critical part of the system, and it's in good shape. In contrast, the various programs included in the retail release of OS/2 1.1 obviously need some more work. These are the programs that are important for using Presentation Manager. They must be easy to use and intuitive, and they must be models of good Presentation Manager programming style. They are not

Another troublesome aspect of the Presentation Manager involves the development and distribution of device drivers for video display adapters and printers. At this time it seems as if IBM is interested in supporting only video boards and printers that have IBM labels on them. The people at Microsoft have taken a much greater interest in getting printer drivers written, but it is not clear at this time how these drivers will be distributed. I think that IBM and other hardware manufacturers that sell OSZ should be involved at least in the dis-

tribution (if not the development) of these device drivers.

OS/2 and the Presentation Manager have taken a tot of flak regarding the hardware (particularly memory) required to run the system with reasonable performance. This is partially the result of OS/2's being released at a time when memory prices are very high. But certainly no one at IBM or Microsoft can claim that the OS/2 and Presentation Manager code is as memory efficient as possible. This is another area where more work should be done, even if it's likely that memory prices will be more reasonable by the time most users are ready for OS/2.

It strikes me that it would truly be a shame if the success of a system as fine as this one were compromised by something as trivial as memory chips.

Charles Petzold is a contributing editor of PC Magazine.

in the middle of what you're doing to format a diskette.

No one likes to be interrupted. Especially by a diskette.

So, we're introducing 5¼ inch formatted diskettes for IBM* PCs and compatibles. They eliminate all formatting hassles, so you won't have to be interrupted anymore.

They're compatible with DOS versions 2.0 and higher. And our Mark Q* process assures you of our usual product standards. Exceptional durability,

consistency, reliability and performance.

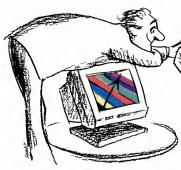
So next time you're saving data and don't want to waste any time, make sure you have 3M formatted diskettes.

We guarantee you'll never have to stop in the middle of what you're doing again.

If you'd like more information, call us toll-free at 1-800-888-1889. Extension 40.

3M

Samtron Color Monitors Make Sense In Black & White.



Whether you want one color, no colors or 256 colors,
Samtron monitors probably have all the specs you're looking for.
Without all the usual expense.
That's because we don't offer you every model under the sun.
Only the most popular ones.

Like our new CGA. EGA and VGA series.

Which means they can be mass produced in Korea very economically. By Samsung, the world's largest monitor manufacturer.

Which also means their reliability is world class. And they're designed in the U.S. for a completely American look and feel.

So before you spend too much green on high-priced monitors, check out Samtron's colors.

You'll like the way their numbers look in black and white.



USA HEADQUARTERS
SAMSUNG ELECTRON DEVICES
AMERICA, INC.
TEL: (213) 802-8425
FAX: (213) 802-8420
PARTS & ORM SERVICE
TEL: (714) 522-1262

CUSTOMER SERVICE EAST TEL: (800) 227-3378 MID-WEST TEL: (800) 277-3378 WEST TEL: (800) 543-5752 HOME OFFICE SAMSUNG ELECTRON DEVICE SEQUE, KOREA TELE (02) 772-6688 TELEX: STARNEC K33217 FAX: (02) 772-6579 USA DISTRIBUTORS
SAMSUNG AMERICA INC.
TEL: (201) 592-7900
IMCOM GROUP INC.
TEL: (800) 255-8163
SAMSUNG PACIFIC INT'L INC

CANADIAN DISTRIBUTORS CANARA TECHNOLOGIES INC. TEL: (416) 890-2525 STERLING MICRO SYSTEM INC TEL: (804) 270-3233

ADD-IN BOARDS FOR THE HP LASERJET

Post-Purchase PostScript

Adding PostScript to your LaserJet is more than just an inexpensive way to get fancy typesetting. The speed improvement over an Apple LaserWriter can be startling.

ou say you bought a Hewlett-Packard Laserlet Series II for desktop publishing, and now all the graphic artists around the shop have been kicking PostScript sand in your face? Do you long for the infinite control of PostScript outline fonts but can't stretch your budget to accommodate a new PostScript printer? If this is what's troubling you, put your mind at ease, because help is here.

In its original state, Hewlett-Packard's old reliable is quite capable of handling the great majority of the desktop publishing tasks that will ever be thrown at it in a typical business setting. Still, PCL, the Laserlet's native printer control language, has its limitations, and there are certainly times and places that call for PostScript.

You need a PostScript printer if you send your final copy to a high-quality Linotronic typesetter and you want to create good-quality page profs from the same code, for example. Or, if you are doing full-page presentation graphics, you need PostScript if you want to print at more than the 150-dot-per-



inch resolution that is practical on the LaserJet. And many desktop publishing programs have better drivers for PostScript than for the unenhanced LaserJet.

Whatever the reason, you don't have to chuck your LaserJet and start over with a new printer. Today, a number of solutions, both hardware- and software-based, bring the power and flexibility of PostScript to your LaserJet. By taking advantage of the Series II's expansion slot and enhanced features, you can pump it up into a typographic powerhouse that's even faster than a standalone PostScript printer. And all it takes is an open slot in your computer, a few free megabytes of disk space, and 3 minutes with a screwdriver. Plus, of course, a fair amount of cash-about \$2,300, give or take \$500, which will buy any of the six systems tested here.

A CUSTOM CONNECTION Physically, all six of these products look remarkably similar, being made up of the same basic components: a board that you install in an unused expansion slot in your computer; another, much smaller board that fits into the expansion slot on your Laser-Jet Series II; and a custom cable that connects these two cards. Special software drivers help them all work together.

The board that goes in your computer is the brains of the whole operation. It is essentially a single-board PostScript controller, built around an independent micro-processor supported by 2MB or 3MB of RAM (in some cases expandable to 6MB). Most of the cards use a Motorola 68000 microprocessor. The exceptions are the Conographic system, which uses a proprietary CPU, and the Princeton Publishing Labs system, which uses an advanced RISC processor that gives it a considerable boost in speed.

The system memory stores the Post-Script software and interprets the Post-Script commands that define the format of the page. It also stores the font outlines and is used both as a workspace for holding the individual characters as they are formed from the font outlines and for holding the image of the page as it is formatted.

As a page is created, it is sent out to the printer through a high-speed video port that is connected directly to the printer's laser imaging system, through a second board installed in the printer's expansion slot (located behind a small oblong plate to the left of the regular port connectors). Consequently, these systems are capable of much better resolution than a stock LaserJet because they are not limited by the printer's memory.

OPERATIONAL DIFFERENCES Of the six products reviewed here, only the QMS JetScript uses the genuine PostScript language licensed from Adobe Systems, the developer of the page description language. The other manufacturers chose instead to use one of the recently released PostScript clone products. In our testing, we did find some evidence of incompatible behavior on the part of some of the clones, but overall they seemed to do as well as the true-blue Adobe product.

The products can differ significantly in their operation, however, depending on how the PostScript code is treated. Most of the systems tested here can be configured to take over one of your DOS printer ports (LPT1 through LPT3), allowing them to

■ These boards produce blazing times for graphics and give up but little to an unadulterated LaserJet in text speed tests.

be used directly from any application that can send a stream of PostScript code to a printer. Another, less convenient, approach is to print your PostScript code to a disk file and then process it with a separate PostScript interpreter program to get a printed page. Since the PC Labs benchmark tests were run using PostScript files that had been printed to disk, you should be aware that these products might perform differently when printing directly.

In any case, these boards are fast, producing blazing times for graphics, while giving up little to an unadulterated LaserJet

Series II in text speed tests. On PostScript graphics, the differences are especially dramatic: a job that required between 25 and 30 seconds for the fastest add-in boards to handle ate up over 18 minutes on the 68000-based Apple LaserWriter NT, and a full 7 minutes on the 68020-based LaserWriter NTX.

A REAL BARCAIN But what do you give up by adding PostScript to your Laserlet Series II, besides a couple of thousand dollars? The answer is, not much. In most cases, you can still use your printer as a Laserlet. Because the add-in boards have a custom connection between the computer and the printer, your standard parallel or serial port connection to your Laserlet is still in place. However, if you choose to go this route, be aware that you may face more work at installation time to avoid port conflicts.

If you have an XT compatible, your choices are somewhat limited, because some cards require a 286- or 386-based machine. All of the cards fit just fine in 8-bit slots, however, the two cards with 16-bit edge connectors can be configured to work in 8-bit slots without a problem. Even if your computer is an IBM PS/2 with Micro Channel expansion slots, you are not left out of the picture; a number of these manufacturers have Micro Channel versions of their products or are planning to release them in the future.

Also, be careful if you're counting on sharing your newly PostScript-compatible printer. Some of the boards do not work in network servers, and those that do are sometimes limited in the types of networks they support. Moreover, the nonstandard cables these products use make it certain that you will not be able to hook them to a printer switch box.

Aside from these small points, these boards turn out to be remarkably attractive buys. Not only do they run significantly faster than most PostScript printers available on the market today, but you also won't have to pay for the privilege of keeping your LaserJet. With discounted prices for the Series II running at \$1,700 to \$1,800, these boards let you acquire a PostScript-compatible laser printer for about \$4,000. And best of all, you still have your LaserJet.

Conographic Corp. produces a number of high-performance graphics products, including high-resolution displays for desk-top publishing applications. Its entry in the PostScript add-in race is the \$2,695 Cono-Desk 6000, a board that represents a decent value despite its high price.

The ConoDesk 6000 is based on a sandwiched expansion board built around a proprietary 32-bit microprocessor with 2.5MB of on-board memory. The board comes with a 16-bit edge connector but can be configured so that it will work in an 8-bit slot. The manufacturer recommends that you use it with a 286- or 386-based computer. The processor board connects to an HP LaserJet expansion card through a special cable. The cable has a standard 25-pin connector on the printer end and a 26-pin connector the size of a 15-pin connector on the computer end. This unusuallooking combination eliminates the possibility of confusion about which way to install the cable. Different versions of the printer adapter are available for the older LaserJet and LaserJet Plus models, as well as for the Canon I RP-II Brother HI -8 and the Ricoh PC 6000/EX.

Installing the ConoDesk 6000 is straightforward. Before you put the processor card in your computer, you run a program that polls different parts of your computer system, searching for possible conflicts. When it has finished its search, the program shows you how to change switch settings and software parameters on-screen, eliminating frustrating trial and error in the installation process. Before you can use the ConoDesk 6000 after power-up or reset, you run a short program that initializes the card.

A pair of 1.2MB floppy disks containing the PostScript programs, font outlines, and utilities accompanies the board.

TWO-STEP PRINTING Printing a document using ConoScript, the unit's Post-Script-compatible interpreter, requires two steps: First you must print out the Post-Script commands to a disk file; second, you enter a command and the filename at the DOS prompt to translate and print the document. (ConoScrint also allows you to



The ConoDesk 6000 (\$2,695) uses a PostScript interpreter program to print documents from disk files of PostScript code.

issue PostScript commands interactively, for quick drawing on the fly.) According to its maker, ConoScript has been certified by an independent testing laboratory for compatibility with Adobe's PostScript, Version 47.0.

This approach can be convenient enough if you already have the PostScript output files on-disk. But if your application program routes its PostScript output only to a standard parallel or serial port, the ConoDesk 6000 will not be able to process

it. And using ConoScript requires your computer to have an 80287 or 80387 math coprocessor chip.

You can, however, print directly from Ventura Publisher and from Windows applications such as PageMaker by using the special high-speed custom drivers that come with the board. (You do not need the coprocessor to use the product with these custom drivers.)

In the graphics portion of the PC Labs benchmark tests, the ConoDesk 6000 was one of the faster performers. In the text portion of the tests, it was among the slower products.

Overall, the ConoDesk 6000 is a solid and easy-to-install performer, offering a full complement of PostScript fonts. On the other hand, it has the second highest list price in the pack, and it requires an inconvenient two-step process to print a PostScript document. If you can live with this, it still represents a good value in terms of features and performance.

FACT FILE

Conographic Corp. 16802 Aston St. Irvine, CA 92714 (714) 474-1188 List Price: \$2,695 Requires: 640K RAM, 80287 or 80387 math coprocessor (for ConoScript). Cannot be installed in network servers In Short: The ConoDesk 6000 is one of the fastest for printing graphics, but it is limiting in that you cannot print PostScript jobs directly from the application. If you can get your output into a disk file and you don't mind this two-step process, however, the package can be a good value. DIRCLE 417 ON READER SERVICE CAR

DESTINY TECHNOLOGY CORP. PageStyler

The PageStyler has the lowest price of the bunch, costing (at \$1,790) about the same as the Laserlet Series II printer itself. The question is, what do you give up when you save money over the competing products?

With Type Director And Your Laser Jet, You've Got AWhole New Avenue To Explore In Producing Documents.

typefaces. All the top art directors on Madison Avenue use them to help their ads grab people's



to Type Director," usethem toheloget thesame attention foryour documents.

Co-developed By Hewlett-Packard. Type Director is the fastest. easiest-to-use font generation program you can own for your PC. A joint development of Hewlett-Packard and AGFA Compugraphic Division, it adds remarkable power to your LaserJet printer to produce documents that look like they were prepared by communications specialists. It's ideal for all word processing and desktop publishing applications from the simplest memos to multi-page newsletters.

Compugraphic. One Of The Biggest Names In Type. When you think about it, it shouldn't come as a surprise, After all, AGFA Compugraphic is a supplier of typefaces to top advertising agencies, printers and publishers everywhere. Its typeface library is the biggest and best in the world, with over 1700 typefaces.

The Big And The Small Of It. A high-performance scaling technology found only in Type Director lets you make each typeface bigger or smaller until it's the exact size you want, from a tiny 4 points to a huge 200 points. But no matter what size you finally do decide on, each character will be crisp, clearand handsome.

Seen To It That There Are No Surprises. When you're

using Type

Director, you see the characters on your screen exactly as they'll appear in your output. There are no surprises when you print out the results. And you get the fonts you need in just a few moments-decidedly more quickly than with any other software available today.

You'll Wonder How You Managed Without It. What is Type Director's impact on the fonts you're using now? Not toworry. Type Director will easily manage any "soft fonts" you may have as long as they're Hewlett-Packard LaserJet compatible. (Most are.) By converting to

Type Director, you protect vour investment while makingyourdesktop publishing system much more flexible and useful.

Type Director Does It All. Think about it. Type Director lets you generate characters, monitor and manage your library of typefaces, automatically install them in your application, and immediately send them to your printer—all by touching just a few keys.

Learn By Doing, Not By Reading. Type Director is incredibly

Type Director Compatibility Information.
Type Director Compatibility Information.
Type Director is fully compatible* with the following.
COMPUTENS: BMNT, AT, Pressonal System/2 and compatibiles with hard clists, 640K bytes RAM, running MAC LOG or LOS Z. PRINTERS: Hewlet-Packard Laser, PLLS; Laserlet S00 PLS; Lase Microsoft Windows 2.03 and 2.1; WordPerfect 5.0; Other software programs supporting LaserJet "soft fonts". DISPLAYS: VGA; CGA; EGA; Hercules Monochrome; AT&T 6300; Xerox PC Pull Page Display; WYSE 700 Graphics; Compaq: Monochrome; Hi Res Monitor (96x96); Hi Res Monitor (100x100). *For compatibility information on unliste and applications, phone I-800-873-FONT.

simple to use.

lt's entirely menu-driven, so there's no thick manual to have to hunt through. All you do is respond to the prompts on the screen. A built-in HELP function handles any questions that may arise.

Go Creative With Your Documents Now. You don't have to

wait any longer. Your documents can

Save \$455 On Our Type Director Debut Edition.

Priced separately you'd pay \$680 for Type Director and our Debut Edition of typefaces, but order now and they reyours for only \$225. Here's what you receive at one great price:

 Type Director Font Management Program

. Vol. 1 Four typefaces from the CG Times family ·Vol. 2 Four typefaces from the Univers family *Vol. 3 From the Decorative collection

Park Avenue Dom Casual Uncial Brush

havethat distinctive. professional, creative edge that

gets attention now. All it takes is Type Director. And all it takes to get Type Director is visiting your local Hewlett-Packard dealer, returning the order form adjacent to this ad, or calling our convenient Type Director hotline right nowat 1-800-873-FONT.

AGFA 🐠

AGFA COMPUGRAPHIC DIVISION

The Director is a manifestant of Companies for Companies Vision Mallor is a registered national of Visions Solitans, Inc.
Microsoft Windows, MSDXCS and Mercound Heard on registered industriants of Mercound Copy CLA, EAG, and KI do an endemants of International Insurance Mercounds are industriant of International Insurance Mercounds are industriant of International Companies Mercounds are industriant of International Companies Mercounds are industriant of International Companies in Americans and Albert Companies (Augusta Mercounds) and International Americans and Albert Companies in Americans and Albert Companies (Augusta Mercounds) and Mercounds (Augusta Mercounds) (Mercounds on Product Insurance are industriants) of Albert Companies (Augusta Mercounds) (Mercounds) (Mercounds of their respective holders. © 1989 by AGFA Compus

■ POSTSCRIPT ADD-IN BOARDS



As it comes from the box, the \$1,790 PageStyler from Destiny Technology Corp. has enough memory for only 13 font outlines.

One thing you don't give up is ease of installation and use. The PageStyler installation program copies the three diskettes of files to your hard disk and either steers you through the default settings or examines your hardware to help you make custom settings easy to determine. The manual is well written, and its pages are attractively designed with ample white space, plenty of screen shots, and clear illustrations. It should give even the most timid novice the confidence required to tackle such daunting topics as DIP switch settings and IRO interrupt choices. You can use the PageStyler with any

program that can send PostScript output to a printer port. The manual gives instructions on how to select the PostScript printer driver to use with the most popular application programs. It can be installed in TOPS and 3Com network file servers.

While the PageStyler does not come with standard Adobe fonts such as Times Roman or Helvetica, it does support their Bitstream equivalents: Dutch and Swiss. And it can even append the Adobe names to these fonts to make sure that your applications can recognize them.

WHERE'S THE CATCH? So what do you give up?

First of all, you must compromise on the number of usable fonts. The Page-Styler comes with only a bare minimum of 13 font outlines. If you want the other 22 outlines found in most PostScript printers, you must add a 2MB memory upgrade.

Worse, you give up time. On an 8-MHz IBM PC AT, the PageStyler takes about 2 minutes to initialize and load its fonts, and you do not see a DOS prompt until it is finished. Even then, you must wait an additional minute or so before the initial test page comes out of the printer. When it comes to actual print jobs, the PageStyler

Use Type Director To Make Documents More Professional. Send In This Form Today.

☐ I need Type Director "to produce professional-looking documents. Rush me the items indicated.

	lease send more information.	DOLOGO		
QTY	Type Director Debut Edition, MS/DOS	\$225		
-	(Includes 12 Typefaces: Volumes 1, 2, 3)			
	Type Director Debut Edition, OS/2 (Includes 12 Typefaces: Volumes 1,2,3)	\$225		
	Type Director Font Management Program (Includes 2 Type faces: CG Times, Univers Bold)	\$95		
	Vol. 1: CGTimes†	\$195		
	Vol. 2: Univers†	\$195		
	Vol. 3: Decorative [†] (See ad)	\$195		
	Vol. 4: CG Triumvirate†	\$195		
	Vol. 5: Univers Condensed†	\$195		
	Vol. 6: Futura II†	\$195		
	Vol.7:Microstyle†	\$195		
	Vol. 8: Decorative [†] ② ♦ ★ (ITC Zapf Dingbats 100, 200, 300)	\$195		
	Vol. 9: CG Century Schoolbook†	\$195		
	Vol. 10: ITC Bengulat†	\$195		
	Vol. 11: ITC Lubalin Graph†	\$195		
	Vol. 12:ITC Avant Garde Gothic	\$195		
	Vol. 13: ITC Souvenir†	\$195		
	Vol. 14: Garamond Antiqua†	\$195		
Subt	otal			
App	licable state and local sales tax			
Ship	ping/handling(\$5 per item)			
Total	lorder			
Nam	Name			
Com	pany			
Address [No PO, boxes please)				
City				
StateZipCountry				
Phone Ext				
AGF	AGFA Compugraphic. ☐ MasterCard ☐ Visa			

Account No. __ Today's Date

Order Hotline 1-800-873-FONT AGFA 🚓

AGFA COMPUGRAPHIC DIVISION 90 Industrial Way, MS 90-1-3C Wilmington, MA 01887-9945 (508) 658-5600 Ext. 2484/2485

*Prices stated in U.S. dollars and subject to change with TAII products come with MS-DOS& OS/2 compatible of se noted. Each v

CIRCLE 200 ON READER SERVICE CARD

FACT FILE

PageStyler Destiny Technology Corp. 300 Montague Expressway Milpitas, CA 95035 (800) 874-5553 (408) 262-9400 List Price: \$1 790 Requires: No RAM required (comes with 2.5MB RAM of its own); HP LaserJet Series

Il printer. Can be installed in TOPS or 3Com network servers In Short: The PageStyler has a low price, but it suffers from a lack of font outlines and

slower performance than that of its competitors. More appealing alternatives are avail-

CIRCLE 418 ON READER SERVICE CARD

From the publishers of DIRECT ACCESS

JUGGLE YOUR TSRs WITHOUT LOSING CONTROL.

EXTRA." The innovative memory manager that gives you single keystroke access and control over all your TSRs.

Using RAM resident programs (TSRs) is a tough juggling act. One slip, one wrong keystroke, and they all come crashing down. Now you can get a grip on up to 26 TSRs wh your computer uses only the memory of the largest program (plus 35K for EXTRA). Free your valuable RAM for applications, save your programs to hard disk using extended or expanded memory and tame those memory-hungry TSRs with

EXTRA. There's even a toll free "EXTRA Support" hotline

SAVE \$\$\$ ON POPULAR TSRs!

Buy EXTRA now and receive valuable rebati pons for 5 popular TSRs: Norton Guides, PC Tools Deluxe, Graph-in-the-Box, InvestNow! and Pop Up



INTERNATIONAL

For the name of the dealer nearest you, call: (800) 242-6368

1621 Westgate Road, Eau Claire, WI 54703 (715) 832-7575 FAX (715) 832-0700

CIRCLE 256 ON READER SERVICE CARD



Sure it's Insured? Most computers are not insured. And ordinary

policies may exclude or limit the coverage you need. Do you have the ready cash to replace stolen or damaged equipment? You will if you have SAFEWARE's comprehensive Computerowners coverage. It provides full replacement of hardware, media and purchased software for just pennies a day! Your protection includes theft, fire, accidental damage, natural disasters like earthquakes, and more. Even costly power surges are covered. Just select your system value and premium from the table below. Use the coupon or call for immediate coverage or more information.

Up to \$2,000 \$ 39

\$ 69 \$ 2,001-\$ 5,000 \$ 5,001-\$ 8,000 \$ 89 \$ 8.001-\$11.000 £100 \$11,001-\$14,000 \$129

1-800-848-3469 SAFFHARE On CompuServe,

SAFEWARE, The 2929 N. High St. P.O. Box 02211 Columbus, OH 43202

10 DAY TRIAL. Review your policy for 10 days after you receive it. Satisfaction guaranteed or your money back.	T-I

Address	
	Phone (Daytime)
☐ Check Enclosed ☐ Visa ☐ MasterCard	Exp

Total value of hardware, media and purchased software \$_

Mail to: SAFEWARE. The Insurance Agency Inc. P.O. Box 02211 Columbus, 0H 43202

_____ CIRCLE 728 ON READER SERVICE CARD

PC MAGAZINE - APRIL 11, 1989

ADD-IN BOARDS

was one of the slowest on the graphics test and was merely in the middle of the pack on the text speed test.

The PageStyler looks like a great deal with its low price. But in the end, when you start comparing performance and features with other competing products. you'll find that faster printing and a full set of fonts don't cost much more.

EICON TECHNOLOGY CORP. **EiconScript Card**

The \$2,075 EiconScript Card from Eicon Technology is an interesting but flawed product.

It has many good points. It is relatively easy to install, and because it can be addressed as one of the parallel ports, it can be used with almost any program. It can be installed in the file server for any MS-DOS-based network. Its PostScript clone interpreter has a full complement of 35 font outlines. It comes with 2MB of memory, and you can add up to 2 more megabytes by installing a daughtercard, at a cost of \$600 per megabyte.

Like the other add-in boards in this review, the EiconScript uses a video interface to send the page image to the printer.



FACT FILE

EiconScript Card

Eicon Technology Corp 2196 32nd Ave. (Lachine) Montreal, Ouebec

Canada H8T 3H7

(514) 631-2592

List Price: PC version, \$2,075 USD: PS/2 version, \$2,275 USD

Requires: Card carries 2MB RAM on board

but needs 4MB RAM in host system and 1.5MB free hard disk space; 8- or 16-bit slot. XT, AT, PS/2, or compatible; can be in-

stalled in servers for MS-DOS-based networks only.

In Short: A full complement of fonts and the ability to send output directly to a port or to an intermediate disk file makes the EiconScript look good at first. But poor documentation, questionable quality control, and relatively low performance make this board less appealing than its competitors. Wait for the new 16-

MHz version, due out soon at the same price, before considering this package. CIRCLE 419 ON READER SERVICE CARD































■ POSTSCRIPT ADD-IN BOARDS

It also uses a standard parallel or serial connection for PostScript operations. But this connection can be used to send PCL commands to the printer, so you don't lose your LaserJet's native capabilities.

ERRORS OF OMISSION But the EiconScript suffers from problems of execution, such as inadequate documentation. One step in the installation requires you to specify what kind of printer you're using. The sneaky part is that the manual does not tell you that you have to choose the Laser-Jet Series II option, not the Canon SX En-

gine option (which the Series II is, but that's the wrong answer for the Eicon-Script). According to an Eicon representative, the manual is being revised and a new version should be shipping soon.

More serious were the quality problems we discovered while trying to get the package to work. In the end, a hand-delivered system worked flawlessly, but only after we spent hours fussing over two complete packages that came through the mails.

Once it was running properly, the board proved a lackluster performer at best. According to the manufacturer, the system

uses a "double buffering" technique to increase its performance, holding one page in a portion of memory for conversion into a video signal at the same time that it uses another portion of memory to compose the next page. Yet though it was tested with 3MB of RAM, its graphics times still put it near the end of the pack. And in the text speed test it came in dead last, a full page per minute slower than the fastest system.

By the time this is in print, claims an Eicon representative, the company should be shipping a newer and faster version of the EiconScript card, one with a 16-MHz



PostScript Add-In Boards: Summary of Features

Il of the PostScript add-in boards we reviewed have cer-tain features in common. Each of them utilizes a video interface connection (the number of pins on each connector is indicated in the table). And every board allows you to use your LaserJet printer as such while the PostScript board is installed.

Among the type styles included with every board are Helvetica, Times, and Courier, each offered in roman, bold, italic, and bold italic fonts. In addition, all of the boards support type styles available from third-party vendors.

	PageStyler Destiny Technology Corp. \$1,790	PC Publisher Kit Series II QMS Inc. \$1,995	ElconScript Card Elcon Technology Corp. \$2,075	JetScript QMS Inc. \$2,495	ConoDesk 6000 Conographic Corp. \$2,695	PS-388 Accelerator Princeton Publishing Labs Inc. \$2,795
Card size	8-bit	16-bit	8-bit	16-bit	16-bit	16-bit
Slot size required	8-bit	8-bit	8- or 16-bit	8-bit	16-bit	8-bit
Processor type	Motorola 68000	Motorola 68000	Motorola 68000	Motorola 68000	Proprietary	RISC
Processor speed	12 MHz	12.5 MHz	12 MHz	16.67 MHz	13.3 MHz	10 mips
Base memory	2.5MB	2MB	2MB	3MB	2.5MB	3MB
Minimum memory upgrade	2MB	N/A	1MB	N/A	N/A	N/A
Maximum memory upgrade	4.5MB	N/A	4MB	N/A	N/A	N/A
Computer connector	37-pin	37-pin	37-pin	37-pin	15-pin	25-pin
Printer connector	37-pin	37-pin	37-pin	37-pin	25-pin	25-pin
Number of type styles included	13 (22 additional type styles, \$150)	35	35	35	35	35
Printer control languages supported						
Adobe PostScript	0	0	0	•	0	0
Clone PostScript	•	•	•	0	•	•
DDL	0	•	0	0	0	0
HP PCL	0	0	•	0	0	•
Other	None	None	None	None	None	Epson LQ





At Vendex we design
every computer as a complete system.
We integrate peripherals usually offered only as
options and include an unprecedented package of
14 name brand programs worth thousands of ollars
FREE!...All you have to do is add the

FŘEE!...All you have to do is add the electricity and you're immediately productive.

Incredibly convenient. The

The HeadStart III has two internal drives: a 1.2 megabyte, 5.25-inch and a1.44 megabyte 3.5-inch, both standard.

50 you don't have to Both Standard choose between the two, you use either, depending on your software.

Incredible performance. At the heart of the HeadStart III is a 12MHz 80286 processor with one megabyte of standard RAM, with the hard drive system delivering 32 megabytes of storage operating at 28 milliseconds with astonishing 1 to 1 interleave. Plus, true 16 bit built-in VGA Graphics is component matched for high speed and clarity.

Plus, incredible expandability and support. The HeadStart III is designed for your future as well as your present applications, with four expansion slots for networking and for the diverse peripherals already becoming available. With the HeadStart III, you're OS/2 ready right now. You can add two full megabytes of RAM, without

having to

call toll free

buy any additional boards.

In addition, our PC Coach hotline is available to registered owners with questions about hardware, software or service.

To obtain more information about the HeadStart III and our full line of advanced computer systems, or to find the name of the nearest dealer

You'll see, it really is incredible.

SPECIFICATIONS

MICROPROCESSOR: Instal 1026-12
SPEED LIMIT 10 Switchable
BIOG: Australia 10 Switchable
BIOG: Australia 10 Switchable
BIOG: Australia 10 Switchable
EVANADABLE TO: 3 megabyte
POWER SUPPLY; 16 Switch 12 20 switchable
EVENDARD: 101 key 75; Compatible
GRAPHICS: Voc. Austrance
FLOPPY DRIVES: one 3.5" 1.2 megabyte,
one 3.5" 1.4 megabyte

HARD DRIVE: 32.1 megabyte, 28 milliseconds, 1:1 interleave BUILT IN INTERFACES: Parallel, 2- RS232 serial, mouse, joystick EXPANSION SLOTS: 3 available MOIISE: Sanadard

MOUSE: Standard
SOFT WARE: DOS 3.3, GW Basic, HeadStart
Advanced Environment, Floppy Driver,
Framework II, 3-D Graphica, ATI and
Computer-EEZ Tutorial Software, Xtree har
disk manager, Pablish-eit Chessmaster
SOS Splash VGA paint program, Bookmark, plu
Twist and Shout.

ADSTART AVAINATION PER AUTHOR DIVISIONAD The as referred at Weetle. Exchanging, i.e. 18th a stretument at internation international action of the Control o

HEADSTART III

Built to be compatible with you.™

CIRCLE 731 ON READER SERVICE CARD

■ POSTSCRIPT ADD-IN BOARDS



The \$2,275 PS/2 version of the EiconScript Card requires both a standard serial or parallel interface and a custom video interface to the printer.

68000 processor, a reversible cable, and revised documentation. The new version will sell for the same list price as the current version.

With its uneven documentation, poor performance, and questionable quality control, the EiconScript does not present a particularly attractive value as it now stands. But the planned new release may make it more competitive.

PRINCETON PUBLISHING LABS INC.

PS-388 Accelerator

The Princeton Publishing Labs PS-388 Accelerator was a latecomer to the party at PC Labs, but this just shows Fate's trick of saving the best for last.

Af first glance, the PS-388 looks typical of the breed. It includes a heavy, sand-wiched board with lots of chips and an 8-bit edge connector, which the manual suggests can be installed either in an XT- or an AT-compatible machine. It will work in a network file server. Like the others, it connects to a simple card in the Laserlet by means of a special 25-pin cable. It comes with 3MB of memory and a full complement of 35 Bitstream font outlines. In order to maintain full compatibility with the Adobe fonts, the Bitstream Swiss and Dutch fonts can be accessed using the Hel-

vetica and Times Roman font designa-

Installation and use is a breeze. Because you install it as a standard parallel port, the board can be used from almost any program. You won't need to worry about installing trouble-prone drivers; you can configure the board as LPT1, LPT2, or LPT3, with LPT2 as the default setting. At the same time, you don't lose your Laser-

Jet—you can leave it hooked up to your computer through another parallel or a serial port and still access it directly using another DOS device name.

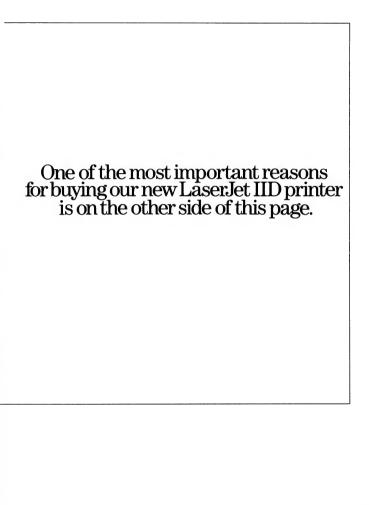
But this breeze is nothing compared to the gusts you'll feel as the pages come flying out of your printer. The PS-388 had the best overall performance of any board tested, walking away from the competition in the graphics and text speed tests, with the exception of the complex PostScript Graphic Times test, in which it placed a close second to the ConoDesk 6000. It faithfully produced all the sample pages and did not appear to have any problems with the test files. Compared to a standalone PostScript printer, this combination is unbeatable.

RISC IS THE ANSWER The PS-388's secret lies in its dedicated RISC processor, developed by Weitek specifically for Post-Script controllers. According to information from Princeton Publishing Labs, the processor is capable of 10 mips (million instructions per second), which far outstrips even the most powerful PC. This advanced technology gives the card more power to convert your application's PostScript commands into an image and then into video signals for the printer.

If the PS-388 has a weak link, it is its documentation. We were given a prelimi-



An advanced RISC microprocessor and ample memory push the Princeton Publishing Labs PS-388 Accelerator (\$2,795) to the head of the pack.



One of the most important reasons for buying our new LaserJet IID printer is on the other side of this page.



The latest member of the HP LaserJet printer family prints on both sides of the paper. But that's just the icing on the cake. The LaserJet IID printer is full of new ideas for making paperhandling easier and more efficient.

An envelope feeder accessory, for one. Instead of having to feed envelopes manually, our new printer does it automatically.

You wanted more paper trays. So the LaserJet IID printer has two of them, each with a 200-sheet capacity. Give us more fonts, you said. And LaserJet Series II compatibility. Done! So now you have a choice of two HP LaserJet printers. Both with that superb quality for text and graphics you've come to expect from Hewlett-Packard.

All good reasons to call 1-800-752-0900, Ext. 297A for the name of your nearest dealer.



■ POSTSCRIPT ADD-IN BOARDS



Shades of Compatibility, Subtle Differences

Some PostScript add-in boards are more equal than others. That's the conclusion we came to when we found subtle differences in the output produced by some of the boards on the PC Labs PostScript Graphics Times test. In fact, the QMS JetScript was the only product tested that replicated the output of an Apple LaserWriter II, the Post-Script printer against which all the products were compared. That didn't surprise us, however: the JetScript was the only board tested that, like the LaserWriter, uses Adobe PostScript rather than a PostScript clone.

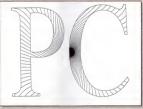
Shown here are some of the fine and not-so-fine discrepancies that can occur when you use a product that isn't completely Adobe PostScript compatible. Although our PostScript Graphics Times test was not designed to be a compatibility test, it should give you some idea of the kinds of problems you might encounter when using these products. For comparison, we've included a sample printed on the Apple LaserWriter II so that you could see how far from the mark some of these products have straved

The Princeton Publishing Labs PS-388 Accelerator board-the fastest of the group-saves time in part by using straight lines to fudge Bezier curves. But we found a less perceptible problem with the output produced by this and some other boards; they do not use the same arc spacing as does Adobe PostScript. The Destiny PageStyler, EiconScript Card, and the Princeton Publishing Labs PS-388 Accelerator use the Bitstream library of type fonts, which is width-compatible with that of Adobe but looks somewhat different

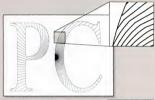
Several boards that use PostScript clones showed roughness in their font-smoothing process. You can see it in the jaggedness at the top of the "P" in the ConoDesk 6000 graphics sample and in the top hook of the "C" in the QMS PC Publisher Kit Series II sample. Other boards may produce similar results with other letters

Freedom of Press, one of the two software PostScript emulators tested, failed to properly handle the densely spaced Bezier curves near the center of our image. After 9 minutes of processing, it delivered faulty output. Freedom of Press also drew thinner, less-well-defined lines than the other products tested.

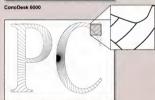
If you regularly need to produce Bezier curves or smoothly scaled fonts, you might not want to consider a product that cuts corners on these features. But if you will be generating normal-sized fonts and more common graphic elements, you may never run into these problems. Differences in implementation, such as using a type library other than Adobe's, will cause problems only if you are prototyping output destined for a true PostScript device. But these differences may be great enough to affect the overall look of your output.

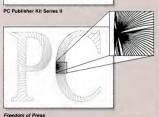


Apple LaserWriter II



PS-388 Accelerator





GETTING POSTSCRIPT THE CHEAP WAY

Two software products—GoScript and Freedom of Press—offer easy and inexpensive upgrade paths to PostScript for the printer you already own.

Like many languages, the PostScript age description language must be interpreted before it can be executed. Buying a printer smart enough to interpret PostScript code is an expensive proposition: on the average, printers that use a licensed version of the PostScript interpreter cost \$2,000 more than those that don't.

However, it's possible to interpret PostScript code using your computer's processor rather than a special processor in a printer—and to save a lot of money in the process. After your computer stores the resultant bitmap image in memory, it can send the file to a non-PostScript-compatible laser, ink jet, or even dot matrix printer using ordinary delivers.

Two software products—LaserGo's GoScript and Custom Applications' Freedom of Press—let you do just that. And at prices of \$195 and \$495, respectively, these programs may be the cheapest implementations of PostScript for a long time to come. Freedom of Press duplicates the 35 fonts supplied with the Apple LaserWriter NTX, while GoScript mimics the 13 fonts of the original Apple LaserWriter. LaserGo is also planning to release a \$395 version of GoScript that will handle 35 fonts.

TWO LIMITATIONS By choosing to go the software route to PostScript compatibility, you'll keep your costs down, but you'll have to accept two major limitations inherent in the technology used by GoScript and Freedom of Press. First, you cannot use either of these software translators from within your application program. While in Ventura or Page-Maker, you must print your file to disk. Only after exiting the application can you

print the image—but you must always do so in batch mode from the DOS prompt. Certainly, this is a drawback if you like to check your work periodically with paper proofs.

The second limitation is that you must dedicate your computer's processor to the job of interpretation and memory management. One of the reasons that the PostScript interpreter was originally built into the Apple LasertWriter was to free the computer from the time-consuming task of translating large graphics files. Both GoScript and Freedom of Press took well over an hour to print out a 5-inch-square sample halftone. While they

were processing the graphics file, the computer was unavailable to any other application.

"Further testing in PC Labs revealed the performance trade-offs that you must make in order to use these products. Large text files, surprisingly, took the longest to print out. In fact, both programs averaged about 1 page per minute on a 20-page document. Compare that result with the 7.8 pages per minute for the Apple LaserWriter NTX. But in spite of the fact that neither program supports Adobe's proprietary font outlines (both programs use Compugraphic and Bitsteam fonts instead), the letter forms that



FACT FILE



Freedom of Press, Version 1.0a Custom Applications Inc. 5 Middlesex Technology

900 Middlesex Tumpike Billerica, MA 01821 (508) 667-8585

List Price: \$495 Requires: 530K RAM, 4MB disk space, 512K EMS, DOS 2.1 or later. Printers Supported: AVR-megabuffer,

BlaserStar 2, Canon B1130, Canon LBP, Epson LQ, Fujitsu DL, Fujitsu Laser, HP Desk-Jet, HP LaserJet, IBM-X24, JLaser, NE P-5, Olivetti PG108, PCL Compatible, PCPI LaserImage, Siemens PT 885-32, Siemens PT90-12, Tandy-DMP

In Short: A PostScript interpreter that duplicates the brains and 35 fonts of the Apple LaserWriter NTX via software—at about half the speed and one-tenth the price. CIRCLE 426 ON PEADER SERVICE CARD.



GoScript, Version 2.03 LaserGo Inc. 9235 Trade Pl., Suite A San Diego, CA 92126 (619) 530-2400 List Price: 13-font version, \$195; 35-font

version, \$395

Requires: 550K RAM, 1.5MB disk space, 1MB EMS, DOS 3.0 or later.

Printers Supported: Canon BubbleJet BJ 130, Canon LBP-8 II. Epson FX Series, Epson LQ Series, HP DeskJet, HP LasserJet Plus, HP LaserJet Series II, HP PaintJet, IBM ProPrinter, NEC PinWriter, Toshiba 24-pin

In Short: A PostScript interpreter that duplicates the 13 fonts in the original Apple Laser-Writer. This inexpensive program doesn't offer many enhancements, but one nicety is its interactive mode, which lets you issue single PostScript commands that will be executed as you type therm—a greaf leature for beginning PostScript programmens. ORULE 407 ONE POST SERVICE CANO they produced were flawless.

Based on how long it took to print our sample text flies, I fully expected to sleep at PC Labs while printing the graphics test document, but I was wrong. Go-Script took 853 seconds—and Freedom of Press 543 seconds—to execute the text. That's not faster than the Apple LaserWriter NTX, which completed the test in 436 seconds, but it is more than 5 minutes faster than several other Post-Script-compatible printers, among them the Apple LaserWriter NT, the Qume Scripten, and the IBM PagePrinter—impressive for such low-cost programs.

MORE TO IT THAN SPEED But speed alone doesn't constitute good performance. Earlier versions of GoScript. for instance, did not support all Post-Script commands. Moreover, the Set Screen command, which is used to generate certain fill patterns, did nothing more than generate an interpreter error in an earlier version. The current version of GoScript, 2.03, which is shipping now, won't balk when it encounters this command. But instead of printing the correct diagonal pattern, it filled our test image with solid black. Moreover, when you select a pattern from a menu, you won't know whether or not it uses the Set Screen command. The GoScript manual should include a list of the fill patterns it does not support.

We didn't experience these problems with Freedom of Press. Besides being an almost bulletproof interpreter, Freedom of Press includes several enhanced features. Batch files make it easy to specify the default printer or to specify a substitute printer driver on the fly. Freedom of Press also has on-line help; it's really just an electronic crib sheet of the printers that

the program supports, but it's helpful

Both Freedom of Press and GoScript allow you to modify the print command slightly, so that you can print more than one file at a time or print multiple copies of one file. GoScript's enhancements aren't many, but one feature that does distinguish this product is its interactive mode. You can issue single PostScript commands that will be executed as you type them, which is great for beginning PostScript programmers.

RETROFITTING POSTSCRIPT

More than anything else, Freedom of Press and GoScript offer easy and inexpensive upgrade paths for the printer you already own. By including Hewlett-Packard Laserlet and Epson drivers, these programs make it possible to bring PostScript compatibility to almost any orinter on the market.

Both LaserGo and Custom Applications have promised color PostScript interpreters within the year. Couple that with the fact that both vendors supply drivers for the IPP aimlet and 24-pin dot matrix printers, and you have a \$500and-under alternative to the \$25,000 QMS ColorScript Laser.

The best news about programs of this kind—and you can expect to see a form more on the market in the next few months—is that they prove that the Post-Script language itself is robust enough to stand up to enhancements, clones, and kludges. All of which is necessary if PostScript is to become accessible to users at all levels of expertise, and with all kinds of equipment.—Lusia Simone

Luisa Simone is an executive editor of PC Magazine.



PS-388 Accelerator Princeton Publishing Labs Inc. 19 Wall St. Princeton, NJ 08540 (609) 924-1153 List Price: \$2,795

Requires: No RAM needed in host system; PC, XT, AT, PS/2 Model 30, or compatible; HP LaserJet Series II. Installable in network servers.

In Short: Blazingly fast, easy to install, and simple to operate, the PS-388 is worth repringing to operate, the PS-388 is worth serior penny if you need to get the best performance out of your Laserlet Series II investment with PostScript applications. Aside from unfinished documentation, it seems to suffer from none of the shortcomings or difficulties of its competitors.

CIRCLE 420 ON READER SERVICE CARD

nary version with missing illustrations and other rough edges. A section described an Epson LQ emulation mode that does not exist. But these are small faults in light of the PS-388's performance and ease of use. In fact, after the first 20 minutes or so, you probably won't need to refer to the manual at all.

The PS-388 is the most expensive board tested here. Yet even at that higher price, it represents the best value, At \$2,795, the board costs relatively little more than its competition, yet it offers dramatically increased performance. In short, this one is a winner.

QMS INC. JetScript

QMS has long had a reputation in the field of PostScript. That company was the first to come in with a replacement controller for original Laserlet and Laserlet Plus printers, which gave these machines Post-Script capabilities through the electronic equivalent of a brain transplant. QMS has made headlines more recently with its line of color PostScript printers.

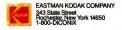
So it should hardly come as a surprise that QMS also has a PostScript adapter for the Series II. The \$2,495 JetScript has a Motorola 68000 microprocessor with 3MB of RAM standard. One small distinction is that the processor runs at 16 MHz.

The Diconix 150 printer. Completes The silent partner



most any system. Quietly. that fits in a briefcase.







Benchmark Tests:

PostScript Add-in Boards and Interpreters

he big news in our roundup is that these PostScript boards are strong performers, outstripping the Apple LaserWriter IINT, the standard against which we compared them. Clearly, a strong factor in this outcome is the efficiency of the Post-Script interpreter. Of the boards we tested, only QMS's JetScript uses a licensed copy of Adobe Pcst-Script-which contributes to its slow times. The JetScript enhances the performance somewhat, however, by pushing its Motorola 68000 processor from 12 MHz to 16 MHz. If you insist on the real thing, the JetScript is a solid performer in this class.

The rest of the boards all use PostScript clone interpreters, and they shaved anywhere from 83 to 98 percent off the PostScript Graphics Times the LaserWriter IINT achieved. All of them even surpassed Apple's leading machine, the 68020-based

LaserWriter IINTX. Princeton Publishing's PS-388 Accelerator and Conographic's Cono-Desk 6000, with their custom processor chips, were among the speediest boards tested. By contrast, the PC Publisher Kit Series II uses an ordinary 68000 processor chip but still chalks up an overall performance record surpassed only by the PS-388 Accelerator (which was the very fastest on text and standard graphics, and second-best on the PostScript graphics test). Remember, however. that if you use a board based on a PostScript clone, what you gain in speed you may lose in compatibility.

As for the software PostScript emulators (which we tested on an 8-MHz IBM AT): with text printing speeds of only about one page per minute, they are clearly not for everyone. They do somewhat better at PostScript Add-in Boards

200

100

100

100

100

Throughput Tests
(Taller bars represent better performance)
Relative Performance
(Apple LaserWriter IINTX = 100)

Performance Time Tests
(Shorter bars represent better performance)
Relative Times
(Apple LaserWiter IINTX = 100)

Throughput Tests
(Results given in pages per mir

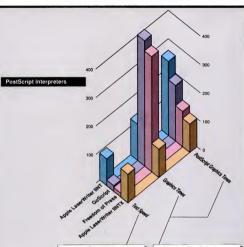
Performance Time Tests

	Text Speed	Graphics Times	PostScript Graphics Times
Apple LaserWriter IINT	6.40	48.20	1,135.00
JetScript	6.50	33.96	996.00
Apple LaserWriter IINTX	6.80	37.93	436.00
PageStyler	7.03	44.14	196.80
ElconScript Card	6.21	35.06	103.50
PC Publisher Kit Series II	7.16	26.03	83.00
PS-388 Accelerator	7.26	21.05	30.43
ConoDesk 6000	6.79	33.67	24.51

graphics, outstripping the LaserWriter IINT on the PostScript graphics test, though lagging far behind it in the standard graphics test.

Freedom of Press was the more efficient of the two packages, beating GoScript on both graphics tests and—surprisingly—approaching the

time achieved by the LaserWriter IINTX in the case of the PostScript test. If most of your PostScript work involves graphics, and if you can tolerate the inconvenience of writing your PostScript output to a file before printing, one of these two products may be a service-able low-cost option.



Throughput Tests (Taller bars represent be Relative Performance (Apple LaserWriter IINTX = 100) Performance Time Tests (Shorter bars represent better perform Relative Times (Apple LaserWriter IINTX = 100)

Throughput Tests (Results given in pages per minute)

Performance Time Tests (Results given in seconds Doet Script

	Text Speed	Graphics Times	Graphics Times
Apple LaserWriter IINT	6.40	48.20	1,135.00
GoScript	1.35	167.16	854.95
Freedom of Press	0.92	153.47	543.00
Apple LaserWriter IINTX	6.80	37.93	436.00

The Text Speed test prints a two-page single spaced business letter: one copy for dot matrix printers, ten copies for laser printers. Print speed is measured in characters per second for dot matrix printers and in pages per minute for laser printers. Because the test document simulates a typical business letter with lots of white space, the speeds achieved by dot matrix printers are almost always much slower than their manufacturers' rated speeds. which are based on printing a single full line of characters

The Graphics Times test uses a file with lines. rectangles, circles, and several fill patterns, which is

stored in an output file on-disk using Microsoft Windows and printed three times using the DOS COPY command. The reported result is the average time per page over the three trials, given in seconds. A separate set of tests is run for each standard emulation that the printer supports

The PostScript Graphics Times test clocks the processing speed of PostScript printers. It uses two large characters as a clipping area and draws a series of Bezier splines. The time reported is the number of seconds it takes to print a page.

(however, the processor chip in our evaluation unit was rated at only 12 MHz). A large. 8-bit expansion board fits in the computer, with a typically small card for the printer, connected by a 37-pin cable. It can also be installed in a network file server. The installation program gives clear instructions on how to configure the board by setting two jumper blocks.

GENUINE POSTSCRIPT When it comes to soft drinks, everyone knows which one is the real thing. And when it comes to PostScript, the real thing is Adobe Systems. The big difference between the JetScript and its competitors is that it is the only one based on Adobe's PostScript. While none of the other systems based on "PostScript-compatible" interpreters made significant errors during our testing, some users will prefer to have the confidence and compatibility that come with using the genuine article.

The JetScript takes over one of the computer's parallel port assignments: either LPT1, LPT2, or LPT3, so you can easily configure any PostScript application program to send its output to the designated port. The installation program makes the decision easier by polling these three devices to find a free port that it can use. (If all three ports are in use, the installation program halts with an error message.)

You can leave your LaserJet hooked up with the parallel or serial connection that



letScript OMS Inc. I Magnum Pass

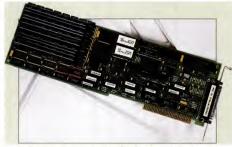
Mobile, AL 36618 (205) 633-4300

List Price: \$2 495 Requires: 2MB RAM, HP LaserJet Series II printer. Installable in network servers

In Short: The JetScript is the only add-in card reviewed here that offers the security of genuine Adobe PostScript, and it can be installed in a network server for shared use. But despite its 16-MHz processor, it is far back in the pack in terms of performance. Though easy to install and use, its faster competitors offer more for the money

CIRCLE 421 ON READER SERVICE CARD

■ POSTSCRIPT ADD-IN BOARDS



The Adobe PostScript version used by the \$2,495 JetScript is significantly slower than the PostScript clones used by its competitors.

was in place before the JetScript was installed. Consequently, you can have access to both a PostScript and a LaserJet printer simply by using different DOS ports for printer output.

Once installed, JetScript is simple to use. Statements in your computer's COh-FIG.SYS and AUTOEXEC.BAT files take care of initializing the card and loading PostScript into the board's memory at power-up. This takes only about a minute on an 8-MHz AT. The board's contents will survive a warm reboxt, so you need do this only when you turn on the power to the computer at the beginning of the day.

Despite its faster CPU speed, the Jet-Script was one of the slower performers in our tests. Thus it will appeal primarily to those who want genuine Adobe PostScript in a trouble-free package. However, its list price is above the average for the six products, and those who are less picky about their PostScript's family background will find faster and less expensive alternatives to choose from among the clone products.

OMS INC.

PC Publisher Kit

The second entry from QMS started life as the Imagen PC Publisher Kit. Since Imagen was purchased by QMS, however, the product has been marketed by The Laser Connection.

The \$1,995 Publisher Kit Series II's notable distinction is its support for DDL, an alternate page-description language to PostScript. A number of desktop publishing programs can create DDL output, including Ventura and PageMaker.

But the Publisher Kit also offers Post-Script support through two different meth-

ods. The first allows you to print from PostScript commands that have been stored in a disk file. The second approach takes over a parallel port and directs the output through the Publisher Kit system. A simple command at the DOS prompt turns



FACT FILE

PC Publisher Kit Series II QMS Inc. 1 Magnum Pass

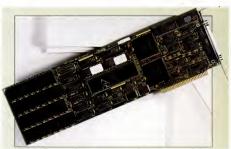
Mobile, AL 36618 (205) 633-4300 List Price: \$1,995

Requires: No RAM needed on host system; 2.8MB of free hard disk space: HP Jaserlet Series II printer. Third-party software package required for installation in Novell network servers. Other networks not supported. In Short: In the top half on performance and next to the bottom in price, the PC Publisher Kit Series II is flexible, easy to install, and

very cost-effective.
CIRCLE 422 ON READER SERVICE CARD

this feature on and off. In either case, you must initialize the Publisher Kit's processor board before you can use it to process PostScript commands.

The Publisher Kit comes with a variety of useful programs, including DDL Laser-



The PC Publisher Kit Series II offers both PostScript and DDL support, as well as many other useful programs, at a low price of \$1,995.

Publisher's Paintbrush

The art of desktop publishing



This masthead was created using the fonts and typographic features of Publisher's Paintbrush.



Gray scale technology gives your images amazing clarity – with up to 256 shades of gray.

Z-SOFT

450 Franklin Road / Suite 100 Marietta, Georgia 30067 (404) 428-0008 FAX: (404) 427-1150 Telex: 6502859318



CIRCLE 744 ON READER SERVICE CARD
Publisher's Paintbrush is a trademark of ZSoft Corporation
Venturia a trademark of Venturia Software, Inc. PC Pagalylatine is a registered trademark of Audio Corporation. Pype Director and
CS are trademarks and Intelligent is a registered trademarks. And Computing Software Corporation.

Desktop publishing's favorite graphic tool now brings you new levels of creativity and page perfection. Publisher's Paintbrush." now has two exciting enhancements – gray scale and Compugraphic Intellifont® technologies. Suddenly, you're in the same league with professional printers and typesetters!

Gray scale publishing: For the ultimate image.

Gray scale technology is a major advance over the conventional "dithering" technique, which simulates shades of gray by varying the density of black dots.

Gray scale images, composed of dots in up to 256 intensity levels, have distinct shades of gray much cleaner than "dithered" images.

Now you can edit a gray scale image with all the features that made Publisher's Paintbrush the premier package of its class. Then export your masterpieces to Ventura Publisher **, PC PageMaker* or business presentation software.

Fonts galore!

Publisher's Paintbrush offers 25 popular

fonts – including a selection in Compugraphic outline format. Hundreds of other perfectly formed outline fonts are available from ZSoft. So your desktop publishing documents gain impact with razor-sharp type.

You have complete flexibility with your type. Adjust leading (line spacing) and kerning (character spacing). Adjust type size – from 1 to 200 point. Adjust italic slope or line slope in 1-degree increments.

Many other popular features. Publisher's Paintbrush provides the

most extensive hardware support in the industry and your images can be used in all major desktop publishing packages.

With zoom out editing, all your editing is done at the resolution of the print device — not the screen. Result: Incredibly smooth edges.

And, our new import utility converts Hewlett-Packard printer files to PCX for post-process editing.

Join the graphic era of desktop publishing.

Give your documents and presentations the classy look they deserve. With Publisher's Paintbrush. Clearly, it's the art of deskton publishing.



TOWARD A COMPETITION-GRADE LASERJET

Some people find that they do not need everything that PostScript offers. If all you want is more speed or flexibility from your LaserJet Series II, here are some options to consider.

These boards work by processing the regular Laserlet commands faster than the printer's controller. They offer scalable fonts through Bitstream Fontware, which creates Laserlet-compatible soft fonts in a wide variety of sizes and attributes from font outlines. These products also give you features beyond the functions of PCL (printer control language) and support high-speed output from desktop publishing programs through proprietary drivers.

In either case, although you won't be able to print from the same PostScript files as your large typesetting machine, you should be able to print desktop publishing or presentation graphics pages much faster than with an unmodified Laserlet.

TALL TREE SYSTEMS JLaser Plus AT4

The JLaser Plus AT4 from Tall Tree Systems consists of the JRam memory expansion card that fits inside the computer and a small JLaser daughtercard that rides on top. This assembly connects by means of a 25-pin cable to the JSX adapter card that fits into the expansion slot of the Laserlet Series II.

You can use the versatile ILaser in a number of ways. It can be addressed as a standard LaserJet using the standard PCL commands. The system also comes with drivers for Windows and Ventura Publisher, so that you can use it to get high-speed output from these desktop publishing programs.

As it comes in the JLaser package, Fontware includes the Bitstream outlines for the Courier, Times Roman, and Helvetica type-style families, plus a symbol typeface. This selection gives you the same set of 13 type-style opions that make up the basic PostScript complex ment. As a plus, you also get Bitstream Charter, an attractive font designed specifically for laser printers.

The package comes with a number of other useful programs and utilities, including JBanner, which uses the Bitstream font outlines to create text pages on the fly, without having to create the full font first and store it on-disk. As the name implies, it can be used to create banners, signs, or presentation text charts. The system can also generate display fonts, so that your screen will match what's on the printed page.

ENHANCED GRAPHICS The LLaser system adds some new capabilities to your Laserlet printer, most notably an enhanced graphics mode that allows printing at a resolution of 300 by 600 dots per inch in addition to the standard 300 by 300 dpi. At present, this feature is supported only by a few graphics programs, but Tall True Systems is developing drivers for desktop publishing programs so that they can take advantage of the extra resolution.

The JLaser system is fairly easy to in-

stall and run, thanks to its installation batch files. You may find that the installation process gets somewhat more difficult, however, if you depart from the default settings. The documentation is acceptable but nothing to crow about. It is spread over four separate booklets, and the information you need can be difficult to find.

If what you need is speed and scalable for outlines and you use your LaserJet printer primarily for desktop publishing, then the JLaser Plus cards offer a good low-cost alternative to a PostScript addiin card.

LASERMASTER CORP.

LaserMaster LC2 CAPCard Controller

The LaserMaster CAPCard is best suited for one purpose: producing desktop publishing pages quickly from Laserlet printers. Originally designed for use with Ventura Publisher, it now has a driver for Windows so that you can use it with PageMaker as well.

The CAPCard system consists of an



FACT FILE

JLaser Plus AT4
Tall Tree Systems
2585 East Bayshore Rd.
Palo Alto, CA 94303

(415) 493-1980 List Price: Model AT2, \$699; Model AT4, \$749; JSX adapter and cable (required), \$140.

Requires: 1MB RAM, HP LaserJet Series II printer.

printer.

In Short: The JLaser kit is a low-cost speedup for your Laserlet Series II. It uses the PCL
command language and also supports Windows and Ventura through special drivers.
The system comes with the Bistream
Fornivare programs and 14 font outlines for
the Courier, Times Roman, and Helvetica
type-style families, which add significantly to
the overful Value of the package:

LaserMaster LC2 CAPCard Controller LaserMaster Corp. 715r6 Shady Oak Rd. Eden Prairie, MN 55344 (612) 944-6069

List Price: Standard version (without scaling fonts), \$1,490; enhanced version (with 13 fonts), \$1,980; enhanced version plus (with 35 fonts), \$2,285.

Requires: 640K RAM (to run most applica-

Requires: 640K RAM (to run most applications), 6.5MB hard disk space for precached fonts; Brother HL-8, Canon LBP-8ii, or HP LaserJet Series II printer.

In Short: The LaserMaster CAPCard costs about as much as the PostScript boards but takes a different course. It creates fonts on the fly and performs quickly, but uses custom drivers and an extended PCL command set to communicate with applications.

CIRCLE 429 ON READER SERVICE CARD

CIRCLE 426 ON READER SERVICE CARD

8-bit expansion card for your computer, plus an option card for your LaserJet Series II printer. Unlike any other board set tested in this review, the CAPCard uses a simple cable with modular phone plugs for the connection. It seems hard to understand how so much data flies through those few wires, but it works all the

SOFT FONTS ON THE FLY Like the JLaser, the CAPCard relies on Bitstream outline fonts, and it comes with either 13 or 35 font outlines, depending on the version you purchase. With most Bitstream products, you must use the Fontware program to generate soft fonts, which are stored on the disk and then downloaded to your printer each time you start it up. That's not the case here: the CAPCard creates the fonts on the fly, so you don't need to use up great portions of disk space for font files. As an added benefit, the font outlines use the same characterwidth tables as do Adobe PostScript fonts, so your final output should look more like PostScript pages.

Installation and setup are fairly quick and straightforward. The manual is well written, and there are installation batch files that help you get all the programs copied to your hard disk so that the card can find them. You'll find that handy utilities make it easy to use the system once it is installed.

The CAPCard can accept output from any application that sends out Laserlet commands, and it handled the PC Labs printer tests without a problem. More likely than not, however, you will buy this card to use with its own Ventura or PageMaker drivers for the faster output performance it offers.

You may hesitate to spend as much for the CAPCard as for a PostScript board, and if you need to send output to a typesetter regularly, the latter will definitely be more useful. But if you produce all your pages on your LaserJet, the CAPCard is worth your consideration.—Alfred Poor



• PS-388 Accelerator

The six PostScript add-in boards reviewed here offer a performance advantage over standalone PostScript printers. But is that enough to make the HP LaserJetladd-in board combination a better buy than a standalone PostScript printer?

If you pay list price for an HP LaserJet and one of the add-in boards that were among the performance leaders in our benchmark tests, you il Spend more than 55,000. That's more than the cost of some PostScript printers, notably our Editor's Choice from our last roundup of printers, the Apple LaserWriter IIIT. In fact, you may have to pay list price for these boards, since they do not yet command a demand sufficient to bear a widespread discount.

Aside from price, two other conprictions are worth noting, Many PostScript printers now offer Laser-Jet emulation through the Post-Script controller, which means you have access to scalable fonts through Laser-Jet commands. This is not the case with add-in boards, which generally rely on the Laser-Jet controller for the HP command set.

Still, no standalone printer comes close to the performance of the best boards in the group, so if raw speed is your primary concern, an add-in board is the best buy. The clear winner here is Princeton Publishing Labs' PS-388 Accelerator. It costs a bit more than the others but its performance puts it so far out in front that it's worth the money. Moreover, a major factor in its high price is the fact that it comes with 500K to IMB more RAM than every other system except one.

The Weitek RISC processor plays a big role in the PS-388's speed, bringing to it a level of performance that has until now been confined to the world of high-tech engineering workstations. The PS-388 is more than just fast, however. It is one of the easiest of the bunch to install and operate, no matter what application you are using to drive it.

We must point out, however, that if you're looking for complete compatibility with Adobe PostScript. you won't find it in the PS-388 or any other add-in board that uses a PostScript clone. In most cases, cutting corners on compatibility is the price that must be paid for speed. If 100 percent Adobe PostScript compatibility is your lighest priority, you will be best off considering the 23,495 QMS-485Cript, which is the only board tested that uses the real thing rather than a clane.

Honorable mention is due the PC Publisher Kit Series II from QMS Inc. It is in the top half of the pack in terms of performance, yet manages to offer the next-to-lowest list price of all. This one is the bargain hunter's selection.

Control, a specialized version of the Laser-Control setup and emulation program for page printers. The DDL LaserControl program allows your laser printer to emulate various popular line printers by converting their commands into DDL on the fly and then printing the DDL output. This handy feature makes it possible for you to use the

PC Publisher Kit with programs that do not support the LaserJet or PostScript—for example, by emulating an Epson dot matrix printer.

SIMPLE BUT FAST The PC Publisher Kit has an 8-bit expansion card with a 68000 processor and 2MB of memory, a



Our Printer Sharing Unit Does Networking!

An Integrated Solution

Take our Master Switch", a sophisticated sharing device, combine it with MasterNet " networking software for PCs, and vou've got an integrated solution for printer and plotter sharing, file transfer, electronic mail. and a lot more. Of course you can also share modems minis and mainframes or access the network remotely installation and operation is very simple

Or you can use the Master Switch to link any computer or penatheral with a secon or parallel interface. The switch accepts over 20 commands for controlling the flow of data. It may be operated automatically by command or with interactive menus. Its buffer is expandable to one megabyte and holds up to 64 simultaneous jobs. The

comes with every unit and unleashes the power of the switch with its memory-resident access to the commands and menus Other Benducts

We have a full line of connectivity solutions If you just want printer sharing, we've got





PO Box 742571 • Housion, Texas 77274 • Tel (713) 933-7673 • FAX (713) 633-0044 • Telex 4648866

CIRCLE 290 ON READER SERVICE CARD

o complete your library of PC Magazine send \$8.00 for each back issue ordered (\$9.00 in Canada, U.S. funds only) to: Ziff-Davis Publishing Company, P.O. Box 5999. Cherry Hill, NJ 08034, Attn: F. Hunter, Be sure to include month and year of the issue ordered. For faster service call 1-609-354-4975.

ADD-IN BOARDS

small card for the printer, and a 37-pin cable. Installation is a snap because there are no settings to contend with on any of the boards; everything is handled through the installation software. The manual shows all the steps clearly and includes screen shots showing the lists of filenames that will appear as the software is copied onto your hard disk.

The unit turned in some impressive performance times, especially when you consider it has the second-lowest list price of the group. But we did run into two problems while testing this as a PostScript printer; both occurred while printing from files of PostScript commands. In one case where the PostScript Executive command came at the top of the file, the Publisher Kit's software and DOS fought over access to the disk, slowing performance to a

The PC Publisher Kit turned in some impressive performance times, especially when you consider it has the second-lowest list price of the group.

crawl; however, this problem is unlikely to arise in most applications. The system also refused to print a file that ended with the DOS end-of-file character (Ctrl-Z), which might give you trouble if you create or edit PostScript files with a word processor instead of generating them directly from your applications.

Overall, the PC Publisher Kit represents an attractive value. With support of DDL, it is suitable for desktop publishing applications. Possibly the best choice if you want to get the best performance for the least money, it is well worth a look.

Alfred Poor is a consultant and analyst in Perkasie, Pennsylvania, and a frequent contributor to PC Magazine.

activated switches, buffers, converten

line drivers, and other products

Commitment to Excellence

cables, protocol converters, multiplexers,

At Rose Electronics, we're not satisfied

until you're satisfied. That's why we have

institutions, and Federal, state, and local

full technical number a one-year warranty

and a thirty-day money-back guarantee.

Call now for literature or

more information

(800) 333-9343

including large, medium, and small

nds of customers around the world

ments. We back our products with

YOUR FAVORITE KEYBOARD. GUARANT

25% SMALLER FOOTPRINT.



That's right. Guaranteed.

Right off the bat, you're going to wonder what to do with all that extra desk space. Then you'll start typing and you won't believe it.

If it sounds like we're excited about our new keyboard, you're right.

As soon as you get your new ZEOS*/RS keyboard, sit down and plug it in.

The first thing you'll notice is a lot of extra space on your desk. The ZEOS/RS (Reduced Size) keyboard is more than 25% smaller than regular 101 Enhanced keyboards vet it features the standard key sizes and layout.

Now start typing.

Can you believe it! That's what we're talking about.

If you don't agree this is the best feeling keyboard you've ever used, return it within 30 days for a full refund.

And that fantastic ZEOS Tactile/Click feel isn't the only thing you'll notice. This keyboard is what speed typing is all about. Our new multi-key rollover feature can handle typing speeds in excess of 100 words per minute.

You not only get the best keyboard made, but you also get that extra ZEOS value. Like an anti-static dust cover at no additional charge. Our famous ZEOS Full Year Warranty, toll free technical support and

Expedited Replacement policy are yours too.
Start enjoying your new ZEOS/RS keyboard right away. Order yours now!

The ZEOS /RS Keyboard, Check These Features!

 25% smaller footprint than regular 101 Enhanced keyboards, yet standard key size and spacing. ■ Multi-key rollover every speed typist

will love. Superb Mechanical Tactile feel with

the perfect "Click." Fully XT/AT and PS/2 compatible.

■ 30 day full money back guarantee and one year warranty. Anti-static dust cover included at no additional charge.

ORDER NOW TOLL FREE 800-423-5891

Open days, evenings and weekends. FAX Orders Dial: 612-633-2310 In Minnesota Call: 612-633-4591 MasterCard, VISA and C.O.D. 530 5th Avenue NW, St. Paul, MN 55112

Se habla Español.

A Special Note from the President of ZEOS International:

Why sell our own keyboard? Well, as you probably know, ZEOS makes some of the best '286 and '386 computer systems around. We sell thousands of them.

Not too long ago we started to notice something. People who bought computers from us were calling back to order extra key-

boards. We decided to call and find out why. These customers told us they love our computers (which we figured) but they love our keyboards too! They were actually going around replacing the keyboards on other brands of computers they already owned.

They were switching everything to ZEOS keyboards! We figured other people might like to replace their old keyboards too. That's why we ran this ad.

I am personally asking you to give this keyboard a try. If you don't like it, we'll refund every dime you paid. Guaranteed.

Greg Herrick, President ZEOS International Ltd



CIRCLE 723 ON READER SERVICE CARD

Please add \$5.00 for shipping & landfling Nur ZEOS hybrand curses with the standard of crided calls. For an additional If Crided calls curvain (IS total) and \$1000, ZEOS keyboards use the standard LIN type connective and some competible. If Just in so them, contact year competer restlar, for \$15.72, per connection and \$0.000, ZEOS keyboards use the standard XT, AT and \$5.2 are trademarks of IBM Corporation. Pixes are subject to change without note. Call for complete seaturely details, Available in I2 languages, call to verify stock.



Complete 12MHz '286 with 32MB Hard Drive! Only \$1395.00

It's the fastest '286-12 you can buy, Workhorse of the industry. Rugged from the ground up. This true Zero-Wait state system features a fast Seagate auto-park hard drive. Nothing can touch it!

- 80286-12 CPU, 6/12MHz Dual Sheed keyboard/hardware selectable. Reset and Turbo buttons right up front.
- · Zero-Wait State DRAM, 512K expandable to 4MB on the motherboard (16MB System Total). EMS capability!
- Fast 32MB Seagate 138R Hard Drive with auto-park, 1.2MB Floppy Drive.
- Ultra high speed Hard/Floppy controller. 1:1 interleave, 800 KB/sec transfer rate.
- · High-Res Amber Display, Tilt/Swivel Base,
- · ZEOS Enhanced 101 Kev Kevboard, with Pleasant Tactile/Click Feel.
- · Serial and Parallel Printer Ports.
- · Clock/Calendar with Battery Backup. 6-16 and 2-8 bit expansion slots.
- 80287 support, up to 12MHz.
- Heavy Duty Case complete with Security Lock and LED indicators.

20MHz '286 HARD DRIVE SYSTEM 286/20-At 20MHz, the fastest '286. Complete with our 32MB, 33ms Hard Drive and IMB RAM. This is what Dazzling Speed is all about. Only \$2095.00

Dazzling

If you're buying a new computer, ZEOS' is your best choice. Why? Because ZEOS custom builds the best computers money can buy and sells them factory direct to you. PC Resource Magazine put it this way, "ZEOS...provides quality comparable with the IBM or Compag and does so for about 70% of the cost."

And a recent review in *PC Magazine* said "comparing the ZEOS with a typical clone is a bit like comparing the Space Shuttle Booster rocket with

a helicopter rotor... If you're looking for one of the fastest rides around at a down-to-earth price, don't pass up the ZEOS. Solid construction, flexible design and escape-velocity performance make it a top flight choice!

We couldn't have said it better ourselves.

That's why ZEOS is fast becoming the preferred choice of corporate, government and institutional buyers around the world. That's why it's the best choice for you. So pick out your dream

choice without question. machine and order it now with confidence. Dazzling performance and

incredible prices await you. Guaranteed. Order now by calling 800-423-5891.

credible

YOUR BEST CHOICE!

We don't just say it. We guaran-

tee it. Your new ZEOS system

comes with a Full One Year

Limited Warranty and our 30

day Full Refund Satisfaction

Guarantee, Fully Compatible

and Rock Solid. Your best

Options Galore. As PC Magazine said, "more options than even the most configuration-hungry-hound could possibly need." Including 14" EGA, add \$495. 14" VGA, add only \$695. An incredible selection of hard drives and virtually any other add-on you could want. Call now Toll Free for details 800-423-5891.

All prices and specifications are subject to change without notice. Please call for current picing and warranty details.

ZEOS is a publicly traded company, MPLS/St. Paul Local OTC. C1889 ZEOS International, Ltd., 530 Sth Avenue, N.W., St. Paul, MN 55112.



The New ZEOS 386SX Hard Drive System. Below '286 Prices! Only \$1895.00

The future is now!

PC Magazine says "386SX-based machines are the right choice..." the new ZEOS 386SX is why. The fidure is yours now with the new ZEOS '386SX. It's even priced below comparable '286 systems!

- 80386SX-16 CPU, 8/16MHz Dual Speed Keyboard Selectable, Reset/Tiarbo buttons.
- · Zero-Wait State DRAM, 512K expandable to 4MB on board (16 MB System Total).
- Shadow RAM and EMS capability.
- Fast 32MB Seavate 138R Hard Drive. L2MB FDD
- Ultra high speed Hard/Floppy controller. 1:1 interleave, 800 KB/second transfer rate.
- · High-Res Amber Display, Tilt/Swivel Base, compatible graphics controller.
- ZEOS Enhanced Tactile/Click keyboard.
- · High Speed Serial and Parallel ports.
- 6-16, 2-8 bit expansion slots, 80387SX Math coprocessor support.
- ZEOS space saver case. Including Security Lock and LED indicators.





Complete ZEOS 20MHz. '386 Desktop System. 65 MB Drive!

Only \$299500 16 MHz systems also available!

The new '386 desktop standard, Featuring our 64K CACHE (twice that of most combetitors) providing Zero-Wait State performance vastly superior to page/interleave memory schemes. Incredible value,

- High speed Zero-Wait 64K SRAM CACHE. Genuine 32-bit Intel 80386-20MHz CPU.
- IMB of Zero-Wait DRAM Extandable to 16MB System Total.
- Fast 65MB Seagate Hard Drive, 1.2MB Floppy Drive.
- Ultra high speed Hard/Floppy controller, 1:1 interleave, 800 KB/sec transfer rate.
- High-Res Amber Display with Tilt/Swivel
- Base, compatible graphics controller. 101 Key ZEOS Tactile/Click keyboard.
- High speed Serial and Parallel Ports.
- 1-32, 5-16 and 2-8 bit slots.
- 80387 math coprocessor support.
- ZEOS 5-bay case, Including Security Lock and LED indicators.



Complete 25MHz '386 Vertical System, 65MB Drive! Only \$3995.00

33MHz systems also available!

ZEOS 25MHz and 33MHz 80386 systems are the fastest, most advanced available anywhere, Review after review, these ZEOS systems are selected as the best price/ performance buys. A power-user's dream.

- High Speed Zero-Wait 64K CACHE.
- Gemine 32-bit Intel 386-25 or 33MHz CPU.
- 1MB Zero-Wait 32-bit DRAM expandable to 8MB on board plus 16MB 32-bit expansion (24MB total).
- Fast 65MB Seagate Drive, 1.2MB FDD.
- Ultra high speed Hard/Floppy controller. 1:1 interleave, 800 KB/sec transfer rate.
- High-Res Amber Display, Tilt/Swivel Base.
- 101 Key ZEOS Tactile/Click keyboard.
- High Speed Serial and Parallel Ports.
- 1-32, 6-16 and 1-8 bit slots. 80387 and Weitek 3167 support.
- · Heavy Duty 6-bay Verticle Case.

Desktop configurations also available.

Order Now Toll Free

800-423-5891 FAX Orders Dial: 612-633-2310

In Minnesota Call: 612-633-4591 MasterCard, VISA and COD Open days, evenings and weekends Se habla Esnañol

*PC MAGAZINE EDITOR'S CHOICE 2/28/89

Can your lightweight database handle a heavyweight challenge?

hen you have a job that's too much for dBASE or Paradox. turn to the real heavyweight, PC/FOCUS.

PC/FOCUS is the number one fourth-generation language, with its own powerful database system. It's complete enough to create the complex reports and applications that others can'twithout resorting to hardto-learn procedural languages.

With the PC/FOCUS window painter, you can do highly customized, menu-driven applications, with help screens and overlaid

windows.

Using just a few words in the PC/FOCUS 4GL, you can put together highly structured matrix reports that include imbedded data, row and column totals, and customized headings. You can create any standard financial report in your preferred format.

And you can draw on as many as 16 different files for one report.

With the powerful PC/FOCUS shared-relational database system, you can report at a level of detail that would otherwise require a large computer. PC/ FOCUS can scan 50,000 records in less than three seconds.

And you can access this power through a choice of user interfaces. A command mode lets the experienced user develop major applications quickly. A pointand-pick windowed interface lets the casual user make a queryor build a substantial

application—using only the arrow keys and the enter key.

What's more, any application you develop in the FOCUS language can immediately be run on any of the larger computers supported by FOCUS.

PC/FOCUS includes modules for graphics, statistics. and communications. And there are optional modules including EQL-an English language interface. spreadsheets with goalseeking capabilities, and

interfaces to dBASE and other PC database systems. There's also a MultiUser

version of PC/FOCUS that works with the major LAN products. In a network, up to 32 users can access one database simultaneously without record lockup. While PC/FOCUS maintains your data integrity.

If you've got a heavyweight job to do, get some real muscle from PC/FOCUS, Call 1-212-736-4433, Ext. 3700, Or write Information Builders, Inc., 1250 Broadway, New York. N.Y. 10001.





PRODUCTIVITY

■ PC LAB NOTES ■ GUS VENDITTO

THE ATTRACTION OF PC MAGNET

If you haven't joined the thousands of readers who have already been drawn to PC MagNet, you're missing more than an easy way to download our utilities. Here's a glimpse inside.

Then we launched our on-line service, PC MagNet, last year, PC Magazine was breaking new ground in publishing history. Aside from fancy graphics techniques and improved photo quality, today's magazines are essentially the same mixture of pictures and stories that appeared a century ago. And while on-line services have been growing slowly in recent years, PC MagNet represents the first time that a publication has put itself within a local phone call's reach of virtually every reader.

Any reader can call PC MagNet at any hour of the day or night to download programs and batch files, to participate in survevs on current PC issues, to ask questions about an article, to talk back to the magazine's writers and editors, and to communicate with thousands of our readers. PC Magazine has become a two-way street, a forum rather than a pulpit.

THE COMPUSERVE CONNECTION PC MagNet's structure is diagrammed in the sidebar "A Guide to PC MagNet." It will be familiar to anyone who's spent time on CompuServe, since it's run through the same dial-in network, which has access phone numbers in nearly every area code in the U.S. and Canada. See the sidebar "Connecting to PC MagNet" for a list of telephone numbers. If you haven't yet signed up, the sidebar "How to Join PC MagNet" will show you how.

You can either call into PC MagNet directly or, if you're already logged onto CompuServe, you can switch over to PC MagNet at any prompt simply by typing GO PCMAGNET. When you do, Compu-Serve passes you over to the PC MagNet VAX that manages our separate operation within the overall CompuServe structure. Our part of the system can accept up to 400

PRODUCTIVITY INDEX

PC LAB NOTES An explanation of PC Magazine's on-

line service, PC MagNet. UTILITIES LASERLST, a utility that puts two full text pages on a single sheet. ENVIRONMENTS

Add your own moving logic to the TIMELINE program. POWER PROGRAMMING The kinds of indexed files and file

index structures are explored. SPREADSHEET CLINIC Calculate time in SuperCalc; Excel modifies certain value entries.

USER-TO-USER Build a hard disk menu system; track bootups with a DOS bug.

POWER USER Create your own pop-up menus with WordPerfect 5.0's macro commands. LANGUAGES

Turbo Pascal's word-align function: a fast way to search text in BASIC. PC TUTOR

Examine large files with DEBUG; interpreting PCMAP's output. CONNECTIVITY CLINIC Combine operating systems easily;

replace a minicomputer with a LAN.

callers at a time. CompuServe bills callers by the minute, at a rate of \$12.50 an hour.

PC MagNet adds several elements to the basic CompuServe SIG (Special Interest Group) structure. To make it easy for callers to dial in and quickly find and download any of our more than 1.000 files, we've set up a Utilities Database. It includes a search engine to help you find files by name, type, issue number, or the department where they appeared in the magazine. You can then download them using XMODEM or one of CompuServe's two error-checking protocols. (For more information on these, see the sidebar "Choosing a Download Protocol.")

A STOREHOUSE OF PROGRAMS If you've only recently discovered PC Magazine utilities, you may be surprised at the programs published in years past. The Utilities Database covers programs published as far back as early 1985.

But there's a lot more available for downloading than the utilities we publish in each issue. There are the benchmark programs used in preparing our reviews: there are the batch files and short programs from User-to-User, PC Tutor, Power Programming, and all of the other Productivity columns: there are shareware and public-domain programs that we've reviewed; and there are indexes, in either dBASE. ASCII, or comma-delimited form, that list every product reviewed in the magazine. year by year, since 1985.

Since that's a lot to wade through and the essence of intelligent CompuServe use is to minimize on-line time, we've also in-

■ PC LAB NOTES

How to Joi

How to Join PC MagNet



Figure 1: This diagram illustrates the process of joining PC MagNet. It shows you the choices you may make and the information you will have to provide. During the process, whenever you see a colon (:)

you are expected to make a choice. Whenever the diagram says Enter, you should type in the information and then press the Enter key. You may stop the process at any time by typing EXIT at any prompt.

cluded a Utilities Index that you can download and search through off-line. To save still more on connect charges, many of the files are stored in an archived (ARCed) format that cuts file size by anywhere from 10 to 30 percent, depending on the type of file. PC MagNet files that carry the .ARC extension must, of course, be unpacked before they can be used. For this, you'll need the program PK361.EXE. The PK stands for the programmer, Phil Katz, and the number reflects the current version; don't be concerned if the PK file posted has a higher number when you get ready to download it. The unpacking utility is stored in the Shareware section of the Utilities Database. Once you've downloaded it and extracted the files by typing PK361, un-ARC files by entering

PKUNPAK filename

THE PERSONAL TOUCH As I indicated, however, PC MagNet is far more than a clearing house for programs and article indexes. It was designed to bring PC Magnatine's readers and editors closer together.

Much of the magazine's success has stemmed from the editors' careful attention to comments from readers. When tips submitted to User-to-User reflected a growing interest in LANs, Connectivity Clinic was born. If many readers ask ques-

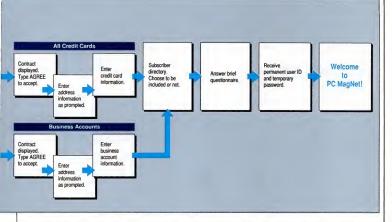
■ PC MagNet isn't just a clearing house for programs. It brings PC Magazine readers and editors closer together.

tions about using a particular kind of software or hardware, we create a PC Lab Notes that delves into the topic. And when readers respond favorably to any kind of product coverage, we start to plan more.

PC MagNet accelerates this process. It cuts out the middlemen of hard copy and postage. Indeed, a large proportion of the Letters to PC Magazine we publish have been received via PC MagNet.

Beyond mere comment, however, readers are taking advantage of our forums to engage editors and writers in dialogue. If John Dvorak should happen to rub a reader the wrong way, Dvorak will be up on MagNet in the Editorial Forum to take the abuse and elaborate on his point. Will Zachmann often conducts public surveys to get a feel for what people are interested in hearing about before he writes his column. And all of the discussion is posted for everyone to see.

Responding to questions, Bill Machrone and other editors have spelled out the reasoning behind our coverage of particular stories. Sometimes, a caller merely wants to clear up a point he found confusing. Or, a number of readers may feel a product has gotten a naw deal. In every case, the issue gets a public airing, with every caller free to contribute his own view. But, when it seems more appropriate, private messages can be posted as well.



The Editorial Forum has evolved into a freewheeling, no-holds-barred session that often goes far beyond topics raised in the magazine. There's even a public tavern of the airwaves here, called The Spike!, for hopelessly irreverent conversations.

Our other forums, Tips and Techniques, Utilforum, and Programming, stick more closely to business. Callers raise dozens of questions in these forums every day. If a question has a simple answer, you're likely to get it rather quickly. But you're also likely to get additional advice that addresses your problem in ways you never considered. If there's an incompatibility between the latest utility and some popular program, the solution will be posted in Utilforum as soon as someone discovers it.

FINDING YOUR WAY AROUND To get the most out of the forums, you'll need to learn a few navigation commands. The accompanying sidebar "Navigating PC MagNet" explains some of the basics. When you join PC MagNet, a packet of detailed manuals is mailed to you within a

few weeks. As many of us have found, the easiest way to stay on top of the forum discussions is to acquire and use a copy of Tapcis, a shareware program that automates message retrieval and posting. Tapcis is available in the Utilities Database un-

■ The Editorial Forum has evolved into a no-holds-barred session that often goes beyond topics raised in the magazine.

der Shareware

To make sense out of the hundreds of messages that get posted in each forum, PC MagNet categorizes them in two ways. The first is by section, which always reflects a particular department in PC Magazine. The Editorial Forum has the largest

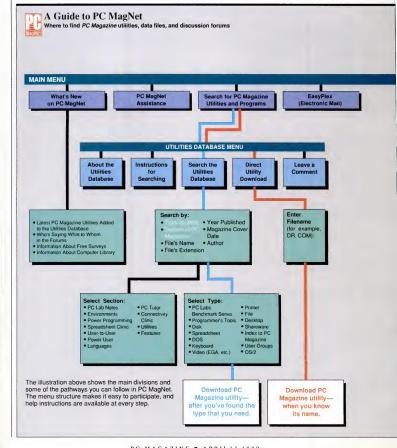
number of sections, covering First Looks, Features, After Hours, and the individual columnists.

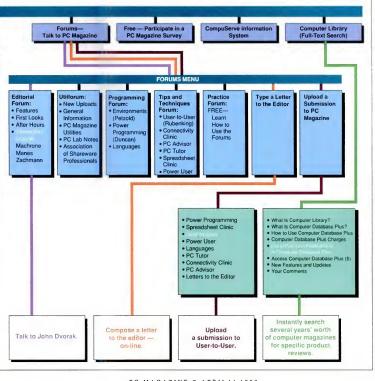
Within sections, messages are broken down into various "threads," or subjects. Any caller who composes a new message has two choices: a subject and a recipient. An illustration will help clarify the point.

A typical thread might begin with a reader asking Bill Machrone what impact Intel's 486 chip will have on PC owners. When prompted by PC MagNet for a subject, the questioner might enter something like "Whither the 486?" His question, with this thread title, would then be posted in the Viewpoints-Machrone section in the Editorial Forum. Within a day or two, Bill Machrone would answer, but in the meantime so might many other PC MagNet members, PC Magazine editors, and PC industry professionals. Everyone can get into the act, responding either to the original message or to a subsequent response.

When you come on-line you can see the subject of the thread and the number of responses it has generated in the forum's message directory. You can access this di-

■ PC LAB NOTES









Announcing a big leap in mouse technology.

Finally, a mouse with an extraordinary body and a mind to match.

A mouse ballistically tuned to accelerate your cursor across any screen with the mere flick of a wrist, and slow it down on arrival for pixel-point control on detail work.

This mouse is <u>guaranteed</u> to work with all applications on your IBM personal computer. And it comes with a great selection of MouseWare* including Pop-Up DOS*-the ultimate DOS handler; Mouse-2-3," the Lotus 1-2-3" shell; and 35 menus for best-selling keyboard-based applications.

The Logitech Mouse. \$139, complete with Logitech's Lifetime Satisfaction Guarantee and unlimited Product Support.

For your nearest dealer, call:

800-231-7717

In California: 800-552-8885

In Europe: ++41-21-869-96-56



PC LAB NOTES

Connecting to PC MagNet

Here, sorted by area code, is a partial directory of PC MagNet's local access numbers for 300- and 1.200-bit-per-second modems. Any of these numbers will connect you to the CompuServe network. Set your modern for 7 data bits, even parity, 1 stop bit, and full duplex

If you don't find a number in your dialing exchange here, or if you want to find a number that supports 2,400-bps operation, start by using the number for the exchange nearest you. Then, once connected to PC MagNet, type GO PHONES to see a complete listing.

PC MagNet can be accessed through alternative communication networks including Telenet, TYMNET, DataPac, Computer Sciences Corp., and LATA Networks. All networks charge a usage premium (CompuServe's is \$.30 per hour), and rates and local access numbers for alternative networks are available on-line. -Christopher Barr

NUMBER 267-0085 368-8300 AC. (201) Parsippany Hackensack N.I (201) Ridgewood N.I (201) 444-3913 N.I 624-6565 Jersey City (201) Wayne Montclair NJ 783-5400 Washington DC (202) 388-4280 Fairlield (203) Naw Haven North Haven 467,3480 Hartford (203) 728-0633 Danbury (203) 797-1815 Bridgeport Montgomary Mobila Tuscaloosa Birmingham 926-0001 (205) 262-0010 478-0688 ΔI (205) (205) 553-1120 Seattla WA (206)241-9111 252-4414 786-6666 Everett WA (206) (206) Olympia Tacoma Portland Pocatello (206) 922-1790 ME (207) 879-0005 384-5660 (208) Fresno CA (209) 252-1892 CA 465-7251 Stockton Modesto CA Naw York Culvar City 758-2090 390-9617 CA (213) Long Beach Los Angeles CA (213) 591-8392 CA 739-8908 Dallas Reading Allentown Philadelphia TX (214) 953-1971 PA 375-4850 776-6960 PA 977-9758 (215)Canton (218) 455-2516 Youngstow Cleveland ОН (216) 743-4992 ОН (218) 781-5720 867-1237 Akron ОН (216) Champaign Springfield South Bend (217) 352,0041 789-0944 (219) Ft. Wayne IN 447-0510 Gary 980-1333 (219)

MD (301) 266-7530

CITY AC (301) (301) Salisbury Hyattsville Baltimora MD MD MD (301) 832-0100 731-2940 Newark Grand Junction DE (302 (303) 241-1885 Durango co (303 co (303) 629-5563 668-0991 879-4900 925-5892 Dillon (303)Steamboat Spng co (303)945-0351 Glenwood Spring (303) Vail Wheeling Huntington Charleston 949-1336 233-9470 733-4010 (304) 768-9700 266-0231 wv Miami FL F1. Lauderdale Cheyenne Jackson WY 837-3027 WY (307) 722-1640 742-9641 Laramie Peoria Bloomingto WY IL (307) 827-3343 Chicago (312) 693-0330 859-1557 Aurora 238-6202 Flint (313) MAI (313) 255-9207 MI 334-2900 Pontiac Mt. Clemens (313) 468-0284 Ann Arbor 663-3934 (313) St. Louis (314) 241,3102 442-4600 Columbia (314) Jefferson City (314) 635-9170 (315) 458-6016 689-8765 284-3812 Wichita (316) Muncie (317) Lafayetta Indianapolis (317) (317) 638-2762 361-0700 Monroe LA (318) Shreveport Lake Charles (318) LA (318) 433-0215 Davenport Cedar Rapid (319) 323-7388 IA 365-9363 Providence Lincoln NE (402)474-1006 Omaha NE (402) 895-5288 266-7014 Atlanta (404) (404) (404) Columbus GA 596-2700 736-8750 Augusta Oklahoma City (405) Billings Helena West Palm Be Melbourna MT 245-0863 (406) MT 449-3680 684-9051 FL (407) (407) (407) Vero Beach 778-0550 Orlando Monterey (407) (408) 896-4298 375-9931 Santa Cruz CA (408)478-0422 San Jose Galveston CA (408) (409) 988-8762 763-5125 PA (412) (412) (413) 285-8187 Pittsburgh Amherst Springfield Milwaukee Green Bay PA 391-8818 549-7431 MA (413) (414) (414) 258-5616 494-0917 WI Livermore Oakland CA (415) 443-9202 San Mateo Walnut Creek (415) (415) CA 591-5591 CA 682-2833 San Francisco CA (415) OH (419) 244-0073 Little Rock AR (501) 224-9311 (502) Louisville Owensboro Portland OR (503) 232-1072 362-2523 (503) (503) Salem OR Eugene Baton Rouge

NUMBER 548-1502 Binghamton Madison La Crosse Atlantic City Cherry Hill Princeton Minneapolis Cambridge Columbus Granvilla Athens Athens
Nashvilla
Gatsinburg
Oak Ridga
Knoxvilla
Chattanooga
Kalamazoo
Grand Rapids
Mendon
Boston
San Diego
Palm Springs
San Marcos
Solana Beach
San Dego
Encinitas
Rano Reno Las Vegas Fairfax Manassas Roanoke Alexandria Ashavilia

AC (504) CITY New Orlaans Albuquerqua Los Alamos LA Medfield Westborough Concord Hudson (508) (508) Brockton (508) (508) (508) (508) (508) (509) Billerica Lawrence Worcester Framingham Spokane San Antonio TX San Antonio Austin Laredo Corpus Christi Dayton Cincinnati Des Moines Williston Park Hicksville Lake Grove TX (512) (513) OH IA (515) NY (516) Hicksville Lake Grove Lansing Saginaw Albany Jackson Phoenix Sierra Vista NY (516) (517) (517) (518) (601) Tucson Δ7 (602) Yuma Nashua Rapid City SD Laxington Ithaca

NUMBER 734-8150 CITY

662-4122

359-7603 366-2617

568-8019 588-3222 667-4266 687-0374

792-2512 875-3814 326-0515

435-3883 444-7234

722-8008

461-1064

771-1630

270-9410 294-1482

932-1470

981-0880

487-2140

439-7491

948-6411

256-2951 459-6390

748-2009 782-7191

Ene

Rockford

Rockford Kansas City FI. Worth Sierra Madra N. Hollywood Van Nuys Memphis Daytona Beach Taltahassee Jacksorville Pensacola Panama City Fairbanks Anchorage Savannah Albany Macon

Macon

Macon Topeka Middletown Poughkeepsie White Plains El Paso Midland Abilene So. Lake Tahoe Sacramento

So. Lake Tal Sacramento Tulsa Greensboro Wilmington Burlington Winston-Sale Ralaigh Canada Edmonton

Montraal

Vancouver

NC (919) (919)

NC (919)

ON (416) (514) 752-4150

PO

BC

(919)

Harrisburg York

(602) (603) 341-3733 259-3446 257-0155 (606)(807) 724-1171 256-6525 785-7530 (608) (608) (609) (609) WI 645-8778 665-7555 921-7066 (612) 342-2207 OH (614) 457-2105 (614) 587-0932 OH (614) (615) (615) (615) (615) TN

592-2109 366-1947 436-2001 483-2292 (615) (618) MI MA (816) MA (617) CA (619) (619) CA (819) CA (619) (619) (619) CA NV (702) (702)

VA

VA

NC

CA

TX

CA

CA Newport Beach Irvina

CA

(714) (714)

(714) (714) (714)

(716)

Charlotta

Napa Santa Rosa CA

Houston Riverside

Anaheim

Pomona San Bernadino Niagara Falis CA

522-0184 877-5804 383-1247 957-3368 478-0653 868-0204 283-6091 325-4584 471-0960 481-3527 569-0697 753-2728 753-2728 323-4426 737-8863 352-7500 368-5707 563-8421 841-9834 274-3991 (703) (703) (704) (707) (707) 333-6654 257-7710 579-1490

359-7801

520-9724

724-0778

851-0145 865-2229

881-1583 284-3570

Pueblo Colorado Sprini Provo Salt Lake City Manchester Ctr Burlington Myrtle Beach Greenville Charleston (801) (802) (802) (803) (803) (803) (803) (803) (804) (804) (804) (804) (804) SC Charleston Columbia Hilton Head Norfolk Virginia Beach Richmond Hampton Charlottesville Bakersfield Oznard Thousand Oaks San Luis Obigov Ventura Santa Barbara Lancaster SC SC VA VA V/A VA VA CA (805) (805) (805) (805) (805) CA CA Lancastar Amarilio Lubbock CA TY Kailua HI San Juan PR San Juan Evansvilla Tampa Winter Havan Sarasota S1. Patersburg Ft. Myers Somerset

AC NUMBER 458-3460

(719) 596-0910 377-1120

925-7042 657-9633 845-7631

362-5580 862-1575 238-8625 255-4686 763-0090 763-5484

785-4970

461-6187

741-0158

888-0555 979-5159

323-7691

486-3386

643-0177

682-2331

NY (718)

NY

PA

942-3888 379-8411 (806) 763,5081 (808) (808) 263-6670 871-6310 728-3012 479-0185 IN (812) 237-8189 (813) 299-3311 (813) 525-0378 (813) 939-7060 443-6402 (813) (814) PA (814) 864-4019 968-3412 (815)MΩ 474-3770 TX (817) 283-0041 357-0971 763-0558 CA (818) CA (818) (901) (904) (904) (904) (904) (904) (904) (907) TN FL 452-1710 257-5019 385-0590 396-7105 434-3911 871-0660 AK 563-8425 355-0222 (912) GA (912) 471-0147 (913) 234-1051 (914) 473-2617 NY TX (914) 761-9380 565-4681 (915) (915) 697-8211 TX 698-1111 CA (916) 541-5940 971-4681 CA (918) (919) 373-1635

392-4700 584-3762

374-8961 738-5157



Introducing Artline." The Graphics Illustrator That Manipulates Type Down To The Letter.



Twist it! Turn it! Anyway you want it. With Artline, you can produce high-quality text effects and original graphics you never thought possible. All on your PC!

Choose a typeface, draw free-hand, trace an image. Then take your graphic design even further. Scale it, rotate it, color it, pattern it, mirror it, copy it...well, you get the picture. You can partner Artline with GEM*

Desktop Publisher, Xerox Ventura Publisher and Aldus PageMaker for logos, headlines and illustrations. And it'll work with almost any printer.

Artline. The ideal design tool for the most innovative, high-quality text and graphics. It's revolutionary. In every sense of the word.

For more information, contact your nearest dealer or call (800) 443-4200.

All artwork shown was created using Artline.

CEM Atline 600

GEN Artline

From ID DIGITAL RESEARCH

CMO... Your Nationwide Source

Sharpen Your Image With This Combination!



Seiko CM1430 Color Monitor

Knowledgeable PC users everywhere are stating a preference for the Seiko Instruments CM-1430. They

already know of its superior dot pitch to the IBM 8514. sharper focus and edge clarity than the Zenith ZCM-1490, and its greater upward compatibility than the NEC Multisync II.

Orchid ProDesigner VGA Adapter

The ProDesigner VGA is the most powerful, expandable yet affordable video card in the series. ProDesigner supports both the 8 and 16 bit bus,



ensuring maximum performance from your system. The VGA card brings your graphics to life with amazing speed. Retail \$495

> Get Both At CMO'S Package Price:

> > 589

MONITORS

Video 210 Monochr. Amber \$ 88

NEC

IC-1402 Multisync

Video 410 TTL Monochrome 145 Video 432 PS/2 Monochrome 169 Color 632 14" VGA 640X480 359 Color 732 PS/2 VGA Monitor 1280 15" 1280X800 639 Cornerstone 899 SinglePage Display Magnavox 7BM623 12" TTL Amber 79 7CM8515 14" Comp./RGB 279 7CM8313 14 Comp./RGB 7BM749 14" Flatsquare VGA CM8762 14" Comp./RGB 9CM053 14" HiRes EGA 9CM062 14" VGA Color 249 369 349



Multisync IIA

Packard Bell PB-1272 12" TTL Mono PB-1472 14" TTL 132 Col. PB-1422EG 14" HiRes EGA

Polaroid	
Palette EGA Plus	2299
Princeton Graphics	
UltraSync 12" VGA	479
Seiko Instruments CM-1430 14" VGA	c20
	639
Taxan 770+ Multi-Vision 14" RGB	499
Wyse Terminals	799
WY-30, 50, 60	Call
Zenith	Cuil
ZFM-1490 14" VGA Analog	579
MULTIFUNCTION CAR	16.
MOLTIFONCTION CAR	/3
ATD Zook on Parent	
ATD-ZuckerBoard Color Half Card	79
Monochrome Graphics Adap	
576K Half Card Memory	59
576K Half Card Memory AT-Primary Memory Board	99
AST	
Six Pak Plus Board	119
VGA Plus Adapter Hot Shot 286 Board Rampage/286 512K	389
Hot Shot 286 Board	349
Rampage/286 512K	399
Boca Research	
TopHat 128K Expansion	129
Bocakam/XI U-2MB Board	109
BocaRam/XT 0-2MB Board BocaRam/AT 0-4MB Board BocaRam/30 0-2MB	149
BocaMCA Serial/Parallel	145
Boca Multi EGA	189
DCA	10,
Irma 2 3278 Board	729
Emerald	
3XTwin Local 5251 Emul.	669
3XMate-48 5250 w/4800Bd	1349
Everex	
Ram 3000 Dlx. 0-3MB Bd.	89
RAM 8000 Dlx. 0-8MB 16-Bi	289
Micro Enh. Dlx. 800 x 600 EVGA 256 Colors 1280x600	270
5th Generation	219
Logical Connection 256K	429
Logical Connection 512K	479
Hercules	
InColor Card	199
Graphics Card Plus	169
VGA Card	Call
Network Card Plus	339
Abous Roard 2 Plus m/OV	319
AboveBoard 2 Plus w/OK AboveBoard PS/286, 512K	419
AboveBoard Plus 512K	429
AboveBoard Plus I/O 512K	579
AboveBoard Plus, 512K AboveBoard Plus I/O 512K Inboard 386/AT 80386 CPU	899
Connection CoProcessor	759
8087 PC/XT CoProcessor	95
8087-2 PC/XT 8MHz CoP.	135
80287-8 IBM XT 8MHz CoP.	219
80387-16 16MHz 80386	399
Orchid Technology	205
TinyTurbo 286 RamQuest II Board	285 545
Paradise	747
AutoSwitch EGA 480	Call

PB-8526MS 14" Uniscan \$	449	ı
Polaroid		ı
	2299	l
Princeton Graphics UltraSync 12" VGA	470	ı
Seiko Instruments	479	ı
CM-1430 14" VGA Faxan	639	l
770+ Multi-Vision 14" RGB Wyse Terminals	499	l
WY-30, 50, 60	Call	
Zenith ZFM-1490 14" VGA Analog	579	l
NULTIFUNCTION CARE)S	
ATD-ZuckerBoard		i
Color Half Card Monochrome Graphics Adapt 576K Half Card Memory	79	ı
Nonochrome Graphics Adapt	59	ı
AT-Primary Memory Board	99	ı
AST		ı
six Pak Plus Board	119	L
GA Plus Adapter	389	ì
lot Shot 286 Board	349	h
Rampage/286 512K Boca Research	399	Г
Soca Research	120	ı
TopHat 128K Expansion BocaRam/XT 0-2MB Board	129 109	ш
BocaRam/AT 0-4MB Board BocaRam/AT 0-4MB Board BocaRam/30 0-2MB	149	ı
RocaPam/30 0-7MB Board	119	ı
SocaMCA Serial/Parallel	145	ı
Boca Multi EGA	189	L
OCA MUITI EGA	109	ı
rma 2 3278 Board Emerald	729	l
XTwin Local 5251 Emul.	669	L
XMate-48 5250 w/4800Bd 1		
2am 3000 Dly 0.3MR Rd	89	ı
Ram 3000 Dlx. 0-3MB Bd. RAM 8000 Dlx. 0-8MB 16-Bit	289	i
dicro Enh. Dlx. 800 x 600	179	ı
Micro Enh. Dlx. 800 x 600 EVGA 256 Colors 1280x600	279	ı
th Generation		ı
ogical Connection 256K ogical Connection 512K	429	ı
lercules	479	۱
nColor Card	199	ı
Graphics Card Plus	169	l
GA Card	Call	ı
Network Card Plus	339	ı
ntel		l
boveBoard 2 Plus w/OK	319	ı
boveBoard PS/286, 512K	419	ı
sboveBoard Plus, 512K	429	
AboveBoard Plus, 512K AboveBoard Plus I/O 512K Inboard 386/AT 80386 CPU	579	
nboard 386/AT 80386 CPU	899	
Connection CoProcessor	759	ı
087 PC/XT CoProcessor	95	
087-2 PC/XT 8MHz CoP.	135	
0287-8 IBM XT 8MHz CoP.	219	
0387-16 16MHz 80386	399	
Orchid Technology	205	
inyTurbo 286 amQuest Il Board	285 545	
amQuest ii board	עדר	

ideo 7 istWrite Video Adapter ega Deluxe Adapter ega VGA Adapter	\$3- 20 2
Genune Inte	٥
INTEL Inboard 386/PC w/1MB *579 TORAGE DEVICES	
	StWite Video Adapter ga Deluxe Adapter gga VGA Adapter Concrete tbor/ 38: 7: INTEL Inboard 386/PC w/1MB 579

	_
Everex	
Floppy Stream 40 40MB Int.	359
Excel Stream 40T 40MB Int	529
Excel Stream 60 60MB Ext	979
lomega	
Bernoulli Box II Int	789
Maynard	
Maynstream 60MB PS/2 Ext.	Call
Miniscribe	
8425 20MB 31/2" 40Msec	259
3650 40MB 54" 61Msec	349
3053 44MB 5¼" 25Msec	499
6085 70MB 54" 28Msec	599
Mountain Computer	
TD-4000 40MB Int. Tape	369
TD-8000 80MB Int. Tape	309
(New)	445
PC-TOO	,,,
TD-4000 40MB TapeBackup	339
Plus Development	339
20MB HardCard	539
40MB HardCard	689
20MB/40MB Passport	Call
Seagate	Can
ST-225 20MB w/cont	249
ST-238 30MB w/cont	289
ST-251 40MB ½ Height	349
ST-4096 80MB Full Height	579
Sony	-17
31/2" 720K Floppy Drive	89
Comments of the comments of th	0,



79 479 599 979 Weltec Laptop Snbsystems Epson 360K Ext. Floppy NEC 1.2MB Ext. Floppy 199 Zenith 360K Ext. Floppy







400

For Quality Computer Products.

ASK OUR SALES CONSULTANTS TO HELP YOU CHOOSE FROM OVER 4,000 PRODUCTS

Ashton-Tate

COMPUTERS AMSTRAD PPC-640 Portable AST Premium 286 Model 80 Premium Workstations Call Desktops and Portables NEC MultiSpeed HD 20MB ProSpeed 286 16MHz 80286 New UltraLite Laptop 9.83 MHz New PC-TOO 640K 8MHz 8088 Dskm 512K 8MHz 80286 Dsktp. 799 512 12MHz 80286 Dsktp. 899 20MHz 80386 Dsktp. 2600 ProSystem 12MHz w/40MB 1999 Toshiba T1000 8088 Lapton T1200 Floppy/HD Laptops T1600 12MHz 80C286 20MB Call Call Wyse 80286/386 Desktops Call Zenith 80286/386 Deskrops Call

COMMUNICATIONS 1200 Baud Internal

2400 Baud Internal

SuperSport Lptps, w/Mod.

1999



PS/2 2400B Internal

1239	
ATD-Zuckerboard 1200 Baud Internal 2400 Baud External	60 129
Everex Evercom 12 1200 Baud Int. Evercom 24+ 2400 Int Evercom 24E+ 2400 Ext Hayes	80 149 199
SmartModem 1200 Baud SmartModem 2400 Baud Intel	269 4 25
2400B Classic Internal	249
M1200 Facsimile Packard Bell	749
2400 Baud Internal PBFAX 100 Group III	149 Call
Panasonic FX-89 Fax Board	699
FX-505 Hi-Res Scanner Practical Peripherals	1049
1200 Baud Internal	65

2400 Baud Stand Alone Sharp FO-220 Facsimile Machine	189
FO-220 Facsimile Machine	999
	000
FO-420 Facsimile Machine	1299
U.S. Robotics	
1200 Baud Direct Int	79
1200 Baud Direct Ext	99
2400 Baud Direct Ext	179
PRINTERS	
Alps	100
ASP-1000 9-Pin Flatbed	189
Allegro 24 24-Pin Flatbed	349



Brother	
M-1709 240cps, 132 Col.	369
HR-20 20cps Daisywheel	329
HR-40 40cps Daisywheel	589
Epson	
EX-800 300cps, 80 Col.	369
FX-850 264cps, 80 Col.	Call
FX-1050 264cps, 132 Col.	Call
LX-800 180cps, 80 Col.	169
LQ-500 180cps, 24-Wire	299
Call For LQ Rebates!	
LQ-850 330cps, 24-Wire	Call
LQ-950 264cps, 24-Wire	Call
LQ-1050 330cps, 132 Col.	Call
LQ-2550 500cps, 24-Wire	Call

LQ-2550 500cps, 24-Wire	Call
Hewlett Packard	
ThinkJet 2225	329
NEC	
P2200 Pinwriter 24-Wire	359
P5200 Pinwriter 265cps	519
LC-890 PostScript Laser	3295
Okidata	
ML-182+ 180cps, 80 Col.	249
ML-320 300cps, 80 Col.	359
ML-390 270cps, 24-Wire	499
ML-393 450cps, 132 Col.	989
Panasonic	
KX-P1180 192cps. 80 Col.	189

LC-890 PostScript Laser	3295
Okidata	
ML-182+ 180cps, 80 Col.	249
ML-320 300cps, 80 Col.	359
ML-390 270cps, 24-Wire	499
ML-393 450cps, 132 Col.	989
Panasonic	
KX-P1180 192cps, 80 Col.	189
KX-P11911 280cps, 80 Col.	259
KX-P1124 192cps, 24-Wire	339
KX-P1592 180cps, 132 Col.	389
KX-P1524 24-Wire, 132 Col	579
KP-P4450 Laser	Cal
Seikosha	
SP1600Al 160cps, 9-Pin	185
SK3000Al 300cps, Color (opt.)	365
Star Micropice	

NX-1000 1	140cps, 80 Col.
NX-1000 1	7-Color, 80 Col.
SC	OFTWARE

Aldus				
Aldus	PageMaker	Ver	3.0	

dBase IV	\$459
MultiMate Advantage II	289
Borland	
Paradox R-Database	439
Quattro	149
Breakthrough	
Project Manager 3.0	355
Central Point	
PC Tools Deluxe	50
PC-II Option Board	129
DAC Software	
DAC Software DAC-Easy Accounting	60
5th Generation	
FastBack Plus	98
Fox Software	
FoxBase + Development	199
Funk Software	
Allways	90
Sideways	40
IMSI	
OptiMouse w/Dr. Halo III	80
Intuit	00
Quicken	33
Logictech	,,,
C7 Mouse w/Software	80
ScanMan Scanner	189
Lotus Development	107
Lotus 1-2-3	289
Lotus Agenda	289
MECA	207
Managing Your Money	119
Meridian Technology	119
CarbonCopy Plus 5.0	119
Microrim	
R:Base for Dos 2.11	439
Microsoft	139
Serial or Buss Mouse	109
Windows 286 Ver 2.1	70
Nantucket	70
	419
Clipper (Summer 87) Peter Norton	719
Norton Commander	40
Advanced Utilities	80

	- 4
COTT - AND A PERSON OF SHIP	I MAN
MSC OmniMouse 139	

	MISC	
	OmniMouse	
	539	
-		_
PaperB	ack	
VP-Plan	ner Plus 2.0	\$119
Peachtr	ee	
Comple	te Accounting	169
Quarte	rdeck	
DESOV	iew 2.02	80
	Technology	
	Starter Kit	179
	re Publishing	
1st Cho	ice 3.0	90
	lisher 2.0	80
1st Gra		89
The Co	mplete PC	
Handsc	an For PC	179
Comple	te Answ. Machine	259
The So	ftware Group	
	Version 2.0	399
	ng Software	
Lap-Lin	k Plus	85
WordP	erfect Corp.	
WordP	erfect 5.0	219
Xerox		2.0
	Publishing 2.0	445



Your Source for Hardware, Software & Peripherals

In U.S.A.

All Other Areas call: 717-327-9575 Fax call: 717-327-1217 Educational, Governmental and Corporate Organizations Call toll-free: 1-800-221-4283

CMO, 101 Reighard Ave., Dept. B1, Williamsport, PA 17701 Over 400,000 SATISFIED CUSTOMERS . MAJOR CREDIT CARDS ACCEPTED

POLICY: Add 3% (minimum \$7.00) shipping and

POLICY. Add 3% (minimum 57.00) shipping and handling. Larger shipments may require additional charges. Personal and company checks require 3 weeks to clear. For faster delivery, use you must be credit and or send to clear. For faster delivery, use you must be credit and or send and the control of the cont typographic or photographic errors.

169 239

CHOOSING A DOWNLOAD PROTOCOL

A protocol is used to ensure that the Affie you download is received without errors. PC MagNet currently supports a number of file transfer protocols, including Xmodem (MODEM7), CompuServe "B", CompuServe "A", DC4/DC2 CAPTURE, Kermit, and CompuServe Quick-B. Selecting which one of these to use is often dictated by what's available within your own communications software.

The two most commonly used protocols are Xmodem, a checksum-based protocol that is included in almost any PC-based communications program, and CompuServe Quick-B, a more advanced protocol that is specifically designed to optimize file transfer between PCs and the CompuServe network used by PC MagNet. If your software package supports it, we strongly recommend that you select Quick-B, as this minimizes the connect time needed to transfer the desired file(s).

To download a file from PC MagNet from within a forum library, enter the browse command, BRO, at the "Enter choice!" prompt. Browse is an easy way to view descriptions of the files available for downloading. If you already know the name of the file, you can specify it as part of the browse command, as, for example

BRO AT.ARC

PC MagNet will display a description of the first available file. To download the file, enter DOW, or just D. PC MagNet will then present a menu of the available file transfer protocols. Choose the CompuServe Quick-B protocol if your software supports it. If not, choose a protocol that your software does support, such as Xmodem or Kermit.

Depending on your protocol choice, you may be asked to enter a filename for your computer. You can enter a complete file specification, including a drive letter and a path to the directory in which you want to store the received file. If you are asked to "initiate the transfer," you make to instruct your software to start the actual transfer. If you're using the Xmodern protocol, for example, simply enter whatever commands your software requires to receive a file via Xmodern protocol,—Salvatore P. Ricclardin.

rectory either by picking Select from the Read menu or by issuing the Browse command at a prompt. Don't be shy about leaving messages! If you have second thoughts, you can delete any message you posted (although you can't delete anyone else's—except those addressed to you).

Each forum has its own flavor. Here's a taste of each from some of the PC Magazine contributors who haunt them.—Gus Venditto

EDITORIAL FORUM One of the most fascinating forums is the Viewpoints-Dvorak Forum, where I have handpicked the smartest and most brilliant technical types in the world to scrutinize and discuss every aspect of every idea imaginable. These guys stun me every time I log on—and I try to log on once or twice a day. So if you have something profound to say or if you have a question of interest to the computing community, then check out the Dvorak section of the Editorial Forum. It's fantastic. Just log in and join in the fun. You'll know whether OS/2 will ever be a hit before the numbers are even posted.

All I can say for my group is that it proves that a columnist is only as good as his readers. I'm sure not smarter than any of these guys. Well, maybe one or two of them (but I'm not telling!). Also look for this section to find the most controversial discussions. If you like to be in the middle of a good fight, then check it out!—John C. Dyorak

Computers have fascinated me since I started reading science fiction in the early 1950s. I got my first computer kit in 1956 or '57. It was called a GENIAC, cost 519.95, and its biggest achievement was the ability to add two three-digit binary

 If you like a good fight, check out the Viewpoints Forum and Dvorak.

numbers to show a four-digit binary sum. From my first experiences with SOAP on an IBM 650 and FORTRAN on 7094s, through COBOL, assembly language, and PU1 on IBM 360s and 370s, right up to Pascal, C, Prolog, LISP, Forth, and C++ on personal computers, I've never lost that early fascination.

Even more fascinating for me is watching the industry and where it's going. That's really what I aim to do in my column and my section on PC MagNet. 1 see the latter as a forum to discuss the critical battles of the day: OS/2 vs. Unix; MCA vs. EISA: the battle to define the user interface of the future; the spreadsheet, word processing, database, and networking wars; and, most of all, the successful guerrilla battle of microprocessor-based systems against the proprietary mainframe and minicomputer dinosaurs. So why don't you join me in Section 10 of Editorial Forum to share and exchange views and ideas on these strategically vital issues .- William F. Zachmann

Confused about the current state of the computer arena? Annoyed about your inability to make sense of it? Enraged that it should all be so perplexing? Me, too. So I won't promise to solve your thorniest problems or tell you how to install a dual-ported carburetor on your Clown 366XS. But I do promise to give the important issues a thorough airing (not to mention a good thrashing when necessary), offer plenty of sympathy and commiseration, and keep my mouth shut and my fingers clenched when I don't have the foggiest

HARD BARGAINS

Now Seagate brings mass storage within the reach of even more people. Our new 21 megabyte ST225R and 42 megabyte ST250R represent a significant price breakthrough for halfheight drives. But low cost isn't the only

benefit. The performance

characteristics of these drives make th well-suited for single-user PC applications. They re faster, easier and less expensive than tape or floppies as backup devices for your existing hard drives. And with an MTBF of 35,000 hours, they feature the same high reliability that's made Seagate the first name in disc drives worldwide.

You can save not only money but time by pairing either of these drives with Seagate's own ST11R controller. With installation software preloaded on the drive, system set-up is fast and easy.

To find out more about high-quality storage solutions at surprisingly affordable prices, contact your authorized Seagate dealer. Or call Seagate at 800-468-DISC, or 408-438-6550.





Count

CompuAdd backs systems and service with some pretty impressive numbers.

Fifty service centers and 230 offices worldwide.

CompuAdd offers optional on-site service contracts from the industry leader—Memorex Telex Corporation. A service technician is in your office within 48 hours. You choose the level of support that's right for your company.

Forty-eight-hour product exchange program.

We solve problems immediately with our tollfree customer support line and, when required, we'll send you a new exchange part by Federal Express'. Within two days. And we pay the freight. Both ways.

Thirty-day money-back guarantee.

We mean it. Return any hardware purchase to CompuAdd within 30 days for a complete refund. No questions asked. Plus, we back every product with a one-year limited warranty.

Fifteen CompuAdd Superstores in ten cities. And more on the way.

Our growing national chain of Superstores means greater convenience and low prices direct to you. Our stores feature mail order pricing, expert repair service and solutions to data processing problems.

Six times recognized by industry publications for quality product design and manufacturing.

PC Magazine has awarded the prestigious Editor's Choice distinction to four different CompuAdd products. PC World conferred their Best Buy award on the CompuAdd Turbo/10. The CompuAdd 386/16 earned Computer Shopper's Best Buy designation.

One year of toll-free technical support.

Our experienced technicians speak your language, answering questions on the installation and operation of your new hardware or software.

on CompuAdd.





CompuAdd computers are fully IBM AT. MS-DOS compatible and are certified SCO™— Xenix/Unix-compatible. They incorporate the latest performance enhancements including ROM shadowing, instruction pipelining, and memory expansion capacities up to 5MB or 16MB of RAM.

The CompuAdd 386 Series

CompuAdd 386/25 . 80386-25 processor running at

- 25MHz or 8MHz softwareselectable system speeds
- . 0 wait state (cache memory) · 32-bit high speed RAM board with 1MB RAM (expands to
- 16MB) · System and option ROM
- shadowing ROM-based setup
- CompuAdd INTEGRATOR™ productivity software package
- Choice of 5.25" 1.2MB or 3.5"
- 1.44MB floppy drive · Dual floppy/hard drive controller
- · Two serial ports and a parallel port built-in . Six 16-bit and one 8-bit expan-
- · Math coprocessor support for
- 80387, Weitek, or both Integrated Drive Electronics (IDE)
- fixed disk drive interface
- Enhanced 101-key keyboard
- · 29.4 on Norton's SI Benchmark 4.0 test

CompuAdd 386/20 . 80386-20 processor running at

- 20MHz or 8MHz softwareselectable system speeds
- · 0 wait state (cache memory) · 32-bit high speed RAM board with 1MB RAM (expands to
- 16MB) · System and option ROM
- shadowing ROM-based setup
- CompuAdd INTEGRATOR
- productivity software package
- Choice of 5.25" 1.2MB or 3.5"
- 1.44MB floppy drive · Dual floppy/hard drive controller
- · Two serial ports and a parallel port built-in
- . Six 16-bit and one 8-bit expan-
- · Math coprocessor support for 80387, Weitek, or both
- Integrated Drive Electronics (IDE) fixed disk drive interface
- · Enhanced 101-key keyboard
- · 23.4 on Norton's SI Benchmark
- 4.0 test.

The CompuAdd 286 Series

CompuAdd 286/20 . 80286-20 processor running at

- 20MHz or 8MHz switchable system speeds
 - . 0 wait state (four-way interleave) . 1MB RAM expandable to 5MB
 - ROM-based setup
- CompuAdd INTEGRATOR productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- . Dual floppy/hard drive controller Integrated Drive Electronics (IDE)
- fixed disk drive interface
- · Two serial ports and a parallel port built-in
- . Six 16-bit and two 8-bit expansion slots
- · 80287 math coprocessor support
- · Enhanced 101-key keyboard
- 20.4 on Norton's SI Benchmark 4.0 test
 - (22.5 rating with 2MB memory and four-way interleave)

\$1695

CompuAdd 286/16

- . 80286-16 processor running at 16MHz or 8MHz switchable system speeds
- . 0 walt state (four-way interleave)
- . 1MB RAM expandable to 5MB
- ROM-based setup CompuAdd INTEGRATOR
- productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- · Dual floppy/hard drive controller . Integrated Drive Electronics (IDE)
- fixed disk drive interface · Two serial ports and a parallel
- port built-in
- . Six 16-bit and two 8-bit expansion slots
- · 80287 math coprocessor support
- · Enhanced 101-key keyboard
- . 16.0 on Norton's SI Benchmark 4.0 test
- (18.0 rating with 2MB memory and four-way interleave)

\$1495

40MB, 28r \$3,799

\$2,249 \$2,599 \$2,799 \$2,495 \$2,845 \$3,045

Order Toll Free: 800-666-1872

Customer Service: 800-999-9901

Fax: 512-250-5760

Teley: 763543 COMPLIADO AUS

USA: 512-258-5575

CIRCLE 320 ON READER SERVICE CARD

12303 Technology Blvd. Austin, Texas 78727

Some Of The Best Networks Are Being Held Together With Tape.



Smart network managers know their network isn't complete until their data is protected by tape backup. And the best security for your network's data is Tecmar's top-of-the-line OT-150 tape backup system. Its 150MB capacity is ideal for holding networks together. The QT series is certified for use with Novell® and other popular networks.

Tecmar's QualityTape systems offer from 40 to 150 MB of data storage in both internal and external models.

Tecmar's OT family.

Leadership.

As the industry leader in tape backup, Tecmar is the choice of more companies, worldwide, than any other tape system-more



than half the Fortune 500 have chosen Tecmar.

That's confidence. And, after all, confidence is a big reason

CIRCLE 384 ON READER SERVICE CARD

for buying tape backup.

Is your network protected? If not, call Tecmar now at (800) 624-8560. Or write Tecmar, Inc... 6225 Cochran Road, Solon, Ohio 44139-3377.



■ PC LAB NOTES

idea about a topic. At times we'll even go off on wild tangents and talk about things only remotely related to computers—such as human beings.—Stephen Manes

UTILFORUM You say you're having problems running a PC Magazine utility? You can't get SNIPPER to snip? ASPRN makes you want to take a powder? Not to worry—head over to the Utilforum and talk to the folks who actually wrote the programs. The Utilforum's message sections are dedicated to giving PC Magazine readers advice on the ins and outs of our programs and routines.

In the forum libraries, you'll find all of PC Magazine's willies. If you're looking for a program from a recent issue, look in Library 0—New Uploads. After 30 days all PC Magazine programs are moved to Library 9—Utilities—where they can be easily accessed. We even have a library for shareware. That's Library 8, reserved for programs written by members of the Association of Shareware Professionals.—Christopher Barr

PROGRAMMING FORUM Have you ever had a dream in which you find yourself in a strange city, a place where the street signs are in a foreign language, and none of the directions make any sense?

That's almost what it's like when you start programming for OS2 and the Presentation Manager. Programming has never been easy, and it's not getting any easier. But if you want help, the PC MagNet Programming Forum is the place to find it. Ilog onto PC MagNet several times a day, and I like to see questions because that means people are working on programs that the rest of us may someday use.

So, whether you've just started with OS/2 or are well along, if you have a question about OS/2 or Presentation Manager programming, just ask. The Programming Forum is quickly gaining a wide reputation as a meeting place for OS/2 programmers, so if I can't answer your questions, there's sure to be someone around who can.—Charles Pets/Id

It's a cold, cruel, confusing world for the programmer these days, what with countless operating systems and programming languages all competing for your pocket-book and, worse yet, for your valuable time. PC MagNet can help you make sense of it all. If you join us in the Programming Forum, you will be treated to nightly discussions with—and advice from—PC experts, consultants, authors, and gurus of every creed and persuasion. You may find our Programming Forum provocative, you may find it informative, you may find it witty—but there is one thing for certain, you will never find that it is boring.—Ray Duncan

TIPS AND TECHNIQUES FORUM You're a Power User—admit it. Your fellow workers come to you with questions about word processing, spreadsheets, databases, all the programs they use. You keep up to date by reading the Power User column in PC Magazine. But when even

you get stumped, just log onto PC MagNet and visit the Tips and Techniques Forum. Between them, our editors have used an amazing percentage of the vast number of applications not only in the areas mentioned above, but in desktop publishing, accounting, telecommunication, and more. And they answer right away. And our readers' experiences cover an even wider range.

PC Magazine's User-to-User column gives you great batch files, patches, and other DOS tips in every issue. But what if one of them just doesn't work on your particular system? Perhaps one of your fellow readers has the exact same system configuration and has found a workaround. Or the editors may already know about your problem and have a solution waiting. Again, the answer is to log onto PC Mag-Net's Tips and Techniques Forum.

NAVIGATING PC MAGNET

The entire PC MagNet system is menu driven, so it's easy to find your way around, but learning a few commands will help you move even faster. When you've mastered the basic commands, you may wish to turn off the menus and work directly in the command mode. You can do this from the Options menu. Throughout the service, the exclamation point (!) is the most common prompt for a choice or command.

THE GO COMMAND Issued together with a destination, the GO command takes you directly to any forum or other place in PC MagNet. To illustrate, here are some of the useful GO commands:

- GO EDITORIAL (to get to the Editorial Forum)
- GO PHONES (for a list of local access numbers)
- GO PROFILE (to set user options)
 GO INSTRUCTIONS (to access general system information)

GENERAL COMMANDS Here are some of the more-frequently used navigating commands:

Ctrl-S—Suspends or freezes the screen so that you can read it. Then just

hit any key to get started again.

Ctrl-C—Cancels the command being executed. This is useful if you've stunbled into an area in which you're not interested. The command may take a few seconds to work, since a large stream of data is probably on its way to you.

T—Returns you to the TOP level of PC MagNet.

M—Brings you to the top of the section menu; it's useful if you've chosen the wrong command and want to try again.

H (or ?)—Calls context-sensitive help. It's a smart idea to save all of the advice to a text file that you can refer to off-line.

READ—Works in forums only, accesses the hundreds of messages stored, starting with the oldest message you haven't read.

REPLY—For answering the message vou've just read.

OP—Brings up your personal options menu. One important option is your high message in a forum. If you want to reread old messages that you've already seen, you change the high message here.

BYE (or OFF)—Signs off and disconnects.—Gus Venditto



ACCOUNTING AT ITS BEST!

MULTI USER Professional Accounting



was designed from inception for multiuser accounting with true record and file locking capabilities. IT HAS BEEN TIME PROVEN since 1982

WE SUPPORT the following networks: Novell, IBM PC LAN, MultiLink Advanced, LanLink, PC-MOS 386, Network-OS, Vianet, Grapevine, STARLAN, PC-NOS. Other LANS are continually being added. Call for information.

NOT *5995**

NOT 1995™

NOT \$42000

TO ORDER CALL (800) 344-2540 8:00-5:00 MST - Monday-Friday Our quarantee is your

assurance of quality!

UNCONDITIONAL 30-DAY MONEY BACK GUARANTEE Product must be returned in resalable condition Restocking fae applicable.

GUARANTEE applicable on all prod-ucts bought directly from COUGAR MOUNTAIN SOFTWARE.



2609 Kootenal, Box 6886 Bolas, ID 83707 208-344-2540 *MS-DOS and XFNIX Microsoft *PC-DOS International Business Machines

ALL 6 MODULES ONLY

+ 11.50 Shipping & Handling VALUE, FLEXIBILITY, POWER, SECURITY. PERFORMANCE, INTEGRITY AND PRICE

COMPARE AND SAVE

LOOKUP WINDOWS THROUGHOUT

GENERAL FEATURES

"LOOKUP" Windows throughout. Menu driven with 2 help references. Multi company and report generator. Sample data files included. Complete audit trail

All modules can post to multiple profit centers. Fully integrated with single source entry Date sensitive user-defined tiscal calendar User defined financial raports.

User can design checks, invoices, statements and User defined chart of accounts, account numbers

and stock numbers up to 15 alphanumerics GENERAL LEDGER

Allows for multi-company ledgers Unlimited multi-level eccounts for departmentalized reporting.

Allows recurring journal entries. User can process transactions 2 periods into next

Allows budgeting ACCOUNTS RECEIVABLE Open invoice and/or balance forward

Allows unapplied payments Prints statements. Handles recurring accounts receivable

Supports partial payments and finance charges. Allows unapplied credit memos. Up to 5 user-defined aging periods Mailing labels and reports with 7 different sorts.

Supports LIFO, FIFO, weighted averages and standard cost

Supports markup, margin or list.

Allows up to 4 places to right of decimal for unit cost and price

> XENIX* Version Also Available. Call For information. CIRCLE 194 ON READER SERVICE CARD

Alerts user to customer exceeding credit limit Sales history reports. Automatic updating of inventory daily Allows return credit memos. ACCOUNTS PAYABLE Can post up to 200 general ledger expense accounts per invoice nnts checks. Automatically prepares payments Supports partial and handwritten checks. rocesses credit and debit memos tes discounts and records discounts taken Generates automatic navroll Provides up to 8 user-defined rates Allows post facto payroll. Allows distribution of peyroll expenses to user-

Supports service or priduct oriented businesses.

User-defined tax tables including multiple sales

SALES INVOICING

Prints packing slins

taxes

delined denartments Benefits and deductions are calculated on fixed amounts Hourly amounts, percentage of gross or variable.

Allows additions to gross which may be taxable. Handles 401K and cafeteria All tax tables easily updated by the user.

Handles payroll draws, per diem pay, contract and piece work, hourly and salary. Handles tip accounting. Prints checks and W-2s

HARDWARE REQUIREMENTS
IBM PC* or compatible. HARD DISK REQUIRED.

■ PC LAB NOTES

And while you're on-line, you should check out the other conversations. You may know the answer to another reader's question and you can earn the reward of satisfaction that comes from helping out. -Neil J. Rubenking

Home of LAN Wizards. One of the regulars on the Connectivity Clinic Forum uses the motto "Networks are My Life" on his business card. That sums up the attitude of many of the people available to answer your questions and help you make the best buying choices when you need to hook one PC to another computer or communica-

 The Utilities Database is where you'll find every program that's been in PC Magazine.

tions service.

Any topic, from the best low-cost LAN for a particular application to alternatives for exchanging data with a mainframe, is fair game on this section of the Tips and Techniques Forum. You don't have to be a LAN guru to participate, but if you want to learn about advanced topics like NetBIOS programming and fiber-optic signaling standards, we can help.

If you need to share a printer, exchange a file, install e-mail, or let ten people use the same data file at the same time, the helpful folks on the Connectivity Clinic Forum have opinions, ideas, and insight they will freely share. Connect with us today!-Frank J. Derfler, Jr.

UTILITIES DATABASE Not to be confused with the Utilforum, the Utilities Database is where you'll find every PC Magazine program, batch file, routine, index, and PC Labs Benchmark Test ever made available by the magazine. It's an easy-touse database, but unlike PC MagNet's forums, you can't send messages to it. We've developed a search engine to help



COMPLETE YOUR LIBRARY

Be informed...Don't miss a word... Order your missing back issues today!



12/27/88—Power Publishing: Design Features, Output, Ease of Use and Compatibility reviewed; PC LABS tests AppleTalk LAN and Appleshare PC Soft-



with 25 Personal Information Managers; FREE program manipulates data Lotus 1-2-3; Software help you trace family root More.



11/29/88—The LAN gateway lets your PC double as an IBM 3270 terminal; WordPerfect 5.0 brings word processing to the DTB ideal; More



ble 4-pound Laptop and other 386s tested; LOTUS 1-2-3, Release 3.0, versus competitors; FREE tiny editor for files up to 64K More.



NATION - The 5th Annua All-Printer Review; 16page reference guide Lasers and Dot Matrix; FREE tips and techniques to write efficient, effective batch files; More.



711/88—PC Labs tests Portables; 0 LIM 4.0 mory Boards, 13 Degmenters; FREE utility accelerate disk goera-



9/27/88---High-Impa Graphics---PC Labs eva ates 21 Image-Maki Packages, 6 Turnkey S tems, 5 Animation P grams; two-dozen des



and Hertz; 13 removeable mass storage options; 3 twisted-pair LANS; More. End Programs pram to write



boards; Toshiba T51 packs 386 power; 21 p grammable comp par ages; 9 budget ATs; Mor



6/28/88—Eleven 20-MHz options investigated, 27 Bar Code readers, Expert tips on type; 10 Faxs chal-



6/14/88 — WORKGROUP COMPUTING, LAN Software and Utilities that do the job; FREE Utility that highlights file of the



5/31/88—SAVE YOUR 5/17/88—The Chan DATA: 18 easy backup programs: PC MagNet is introduced; 8 serious color printers: More. HAM disk needs; More



4/26/88—20-MHz Model 80; IBMs best; PC Labs tests 13 9,600-bps Modems; First look at Ashton-Tate's DBase IV



4/12/88 — Affordable Desktop Publishing; PC Labs tests 6 inexpensive packages; Special OS/2 coverage — How to instal it, what applications to use:



3/29/88—Power to Go; 12 New Portables Hit the Road—Pick Your Price and Performance; IBM's superhi-res PS/2 display adapter: More



3/15/88—Great Graphics at your Fingertips; PC Labs tests 7 PS/2 add-in memory boards; 10 top-charting packages; 18 integrated word processors examined: blogs.



2/29/88—PC Labs test 55 word processors; 1987 tax prep software; 18M's 20-MHz PS/2 Model 80 benchmarked; living with large pricing. More



1/26/88—IBM's OS/2 m viewed; PC Labs test

riewed; PC Labs tests O-MHz Deskpro; do-Itrourself 386s; 17 Lotus -2-3 add-ins; add-ins for word processors; More.

ORDER TODAY, QUANTITIES ARE LIMITED! Just return the attached coupon below or a clearly written order on a separate sheet of paper. Other issues available. Call 1-609-354-4975. Mail Orders only.

Send to:

PLEASE SHIP I				
I am enclosing	\$8 for	each iss	ue ordere	d (\$9
in Canada and	all othe	r foreign	countries	II'S
currency only).	u., o.,,o	o.o.g	0001111100	0.0
cultoney only).				

12/27/88	12/13/88	11/29/88	11/15/8	ļ
10/31/88	10/11/88	9/27/88	9/13/88	3
8/88	7/88	6/28/88	6/14/88	3
5/31/88	5/17/88	4/26/88	4/12/88	3
3/29/88	3/15/88	2/29/88	2/16/88	3
1/26/88	Others			

Ziff-Davis Publishing	g Company, Attn: F. Hunter
P.O. Box 5999, Cherry	Hill, NJ 08034

□ Check/Money Order enclosed \$_

NAME			
COMPANY			
ADDRESS			
CITY	STATE	7IP	



SINCE 1979, servicing our PC buyers with low pricing, technical experience – and reliable service.

SOFTWARE

ACCOUNTING

Bedford	ï
Dac Easy Acct, Ver 3.0	
Dac Easy Light	
Dollars & Sense	1
Managing Your Money 5.0	1
One Write Plus	1
Peachtree Business Accounting	1
Peachtree W/PDQ	2
Quicken	

COMMUNICATION PROGRAMS

Brooklyn Bridg	ø	¢	Ħ	ı	٧	e	n	8	a	ı				٠			٠						37
Carbon Copy F	'n	u	3									٠											10
Close-up																			٠.			J	Ĉв
Crosstalk XVI	ı	Ċ	Û	ì.	ì.			ĺ.								ì.				ï	ï	ı	. 9
Crosstalk MK4	1		Ē	í	G	i		ľ	í	í	1	i		ū	ĺ	g	í	î	0	0		g	11
Desklink						i					i	i	ì										. 9
Flying Dutchm	a	n																					.6
Lap Link Plus		Ĺ	e				0	1				i								0	0	0	7
PC Anywhere I	11																						
Relay Gold 3.0																							14
Smartcom III .	ľ				1		*		•					*	•	1				*	٠	•	14

PROJECT MANAGED

		٠				:	:					
								•	٠	۰	٠	
	2	ċ										
			٠			ŧ.				÷	i	
1							_	_				
ı	t	j	y	۱	ä	ì	t	=				
	ē	i	á		ŕ	ď	ė	í				
										BASE		BASE

WANAGEN	
Clipper	\$41
Condor3	32
DataPerfect	28
D Base IV	46
D Base IV Programmers Edition	70
DB-XL Diamond 1.2	11
Fox Base Plus 2.1	10
Genifer	10
Knowledgeman 2	~~
Paradox 3.0	
Paradox 3.0	
PFS: Professional File 2.0	10
Powerbase 2.3	10
Q&A3.0	21
Quicksilver Diamond 1.2	32
Revelation Advanced	45
R Base For DOS	42
Reflex	9
Relate & Report	11
VP Info	

DESKTOP PUBLISHING

Pagemaker Ver. 3.0
PFS: First Publisher 2.0.
Ventura Publisher 2.0
Ventura Pro EXT

DISKETTES

Maxall 51/4	*DS/	D	C								
Polaroid D											
3M 51/4" DS	S/HD										
3M 514" DS	S/DD				d						
3M 600A	Data 1	ľa	D	e	6		ı				
3M Tape C	artric	da	ė	18							
Verbatim [os/di	D									
Verbatim [DS/H	D	i								
Verbatim 3	3.572	o	K	١.				i	ı		

DOS

ENTERTAINMENT Chuck Yeager Flight Simulator....

Palcon Al	
F15-Strike Eagle	
Gunship	
Hacker II	
Jack Nicholas	
Jet	
Kings Quest	
Kings Quest IV	
Microsoft Flight Simulator 3.0	
Scenery Disk 1-7	
Silent Service	
Spetter Bee w/voice	

GRAPHICS

Bitstream Fonts \$119
Chartmaster 209
Diagram Master
First Graphics87
Grasp
Harvard Graphics 2.12
In-A-Vision
Mapmaster
Microsoft Chart 3.0225
Newsroom31
Newsroom Professional49
Printmaster Plus
Printshop
Printshop Companion
Print Shop Holiday
Show Partner Fx199
Signmaster 132

INTECDATED

Enable OA												\$	352
First Choice													.86
Framework III .													415
Microsoft Work	s										,		.83
Smart Software													
Symphony 2.0													410

LANGUAGES
Brainmaker
Microsoft C 5.1\$
Microsoft Quick Basic 4.5
Microsoft Quick C 2.0
Ryan McFarlan Fortran
Ryan McFarian Cobol
Turbo Basic 1.01
Turbo C 2.0
Turbo Pascal 5.0
Turbo C Pro
Turbo Pascal/Pro

ELECTRONIC ARTS

Chuck Yeager	Sug. Ret \$55	Our Price \$35
Chessmaster 2100		\$32
Abrams Battle Tank	\$45	\$28
688 Attack Sub		\$33
Brand Name Daisy Wheel Printer	\$1195	\$499

Quantities Limited, Prices Good Thru 4-30-89 CALL NOW!

EDUCATIONAL SPREADSHEETS

ris Beacon Teaches Typing \$30	Lotus 1-2-3
rosoft Learning DOS	Lucid3D86
oo Tutor II	Microsoft PC Excel240
ng Tutor IV30	Plan Perfect
	Quattro
UTILITIES	Spreadsheet Auditor
	SuperCalc 5
rays	Surpass 329
ery Watch	Twin Advanced
yliPC19	VP Planner Plus
ywrite52	
e Fast75	CAD &
it	CADa

Autosketch En DesignCad 2D															
Easy Cad 2.05	0131			•	•	•	•	•	• •	•	٠	٠	٠	•	
FastCad				i		•		•	•	ľ				٠,	i
Generic Cad .															
Generic Cad L	evel:	3				i.					į	į			
MathCad 2.0 .															
WORD			_		_	_			_						

WORD PROCESSING	
Borland Sprint	
Easy Extra	
Grandview	į
Lotus Manuscript	
Multimate Advantage II	١
PFS Professional Write	
Varsity4	į
Volkswriter3	
Webster Thesaurus	
Will Maker	
Word Perfect Executive	•
Word Perfect Library 2.0	
Wasteles 2000 Dive	١

Istar 2000 Plus Legal

WAREHOUSE DATA PRODUCTS

Division of AZ Computer Corporation 2727 W. Glendale Ave. • Phoenix, AZ 85051

TO ORDER IN THE USA AND CANADA CALI

We gladly assist the first time buyer as well as the professional systems analyst. Call our toll-free technical service at 1-800-421-3135



HARDWARE

LAPTOP

ARC PRO TURBO 88

Base Unit \$749 Everex 300/1200 COMPUTERS Teac5¼*360K\$79 Everex 2400 INT Sharp Laptop Call Toshiba 3W* 720K 109 +640K 4.77/9.54 MHz Toshiba T-1000 Special 189 Color Mono Graphics Card Toshiba T-1200FB..... Everex Mini 1200 +84 Key Keyboard +2 - RS-232 Serial Port +1 - Parallel Printer Port HARD CARDS Toshiba T-1600 Hayes 1200 Haves 2400 ... Plus Hardcard 20 MB\$519 Holmes 1200 INT 175 Toshiba T-3100E MS DOS 3.3 Toshiba T-5200 Special U.S. Robotics 2400E ARC PRO TURBO 286 Zenith Laptop......Cell U.S. Robotics Courier 2400 Base Unit \$ 1319 U.S. Robotics Sportster 1200 TMG Cardrive 50 529 chrome Monitor\$1408 VIDEO **BOARDS** HARD DRIVES +1MB RAM 8/12 MHz **PRINTERS** •EGA/MDA Graphics Card AST VGA Plus . ALPS ATIEGA Wonder 800 220 Allegro 24 . +2 - RS-232 Serial Ports ATIVGA Wonder Call •1 - Parallel Printer Port •1 - Clock Calendar CITIZEN EVEREX VGA EV673 •MSDOS3.3 180D Hercules Graphics Plus179 MiniScribe Special MSP40 ARC 386 Skyscraper CallCall ACCESSORIES Tribute 124 Paradise Autoswitch EGA 480 EPSON - Call on all models Paradise VGA PlusCall Paradise VGA Proff. Keytronics Keyboards Logical Connection 256K 479 Vega V RAM OKIDATA - Call on all models OKI320/321 Masterpiece 8 Masterpiece Plus 8 OKI390 AT&T OKI391 NTC 101 Keyboard89 OKI393 Stedi-Watt 65 Tergus Laptop Bags Call 150 Watt Power Supply 69 MONITORS 1092-1..... 1124 Magnavox RGB255 **BOARDS** 1191-1 Lan Server Tower . . . Mitsubishi Diamond Scan 509 AST Advantage Premium 512K \$429 1524 UPS NEC Monograph w/Card1369 NEC Multisync 2A529 STARMICRONICS Tripplite UPS BC450 NEC Multisync3D Call Emerson Everex RAM 3000 UPS 200 NEC Multisync XL 2098 Princeton Max 12 138 NX15 Everex Magic Card 16 UPS 300 NX2400..... Everex Maxi Magic EMS UPS 600 645 Princeton Max 15 Evertex Multi Function EMS 95 Evertex Magic I/O Cell Inboard 386 PC Cell Intel Above 286, Plus 416 Intel Competing Co-Devended TOSHIBA UPS 1500 1259 Princeton Ultra 16 Cell 321 SL Everex Magic I/C Inboard 386 PC Intel Above 286, Plus Intel Connection Co-Processor Microsoft Mach 20 Princeton Ultra Sync509 341 SL MICE/SCANNERS 351 SY Samsung TTL Amber Complete Scanners\$149 Samsung Flat .. Samsung RGB w/tilt249 LASER PRINTERS CO-PROCESSOR Call

FLOPPY DRIVES

80287-8

INTEL

80287

80387-20

80387SY

Logitech Serial68

Microsoft Bus w/Paintbrush92

Panasonic FX-RS 505/RS 506 Call

Microsoft Serial w/Paintbrush

Phone Hours: Monday thru Friday 6:30 a.m. - 9:00 p.m. MST Saturday 9:00 a.m. - 5:00 p.m. MST

Viking Viking 2.0..

Zenith 1490

Selko 1430599



 Okidete Laser 6 w/l/F
 \$1519

 Panasonic 4450
 1669

 Toshiba Page Laser
 2629

DIGITIZERS

<sup>All ehipments insured at no extra cost
All prices are subject to change without notice
We do not guarantee competibility.</sup>

Technical Support: 1-800-421-3135 FAX (602) 246-7805

PCLAR NOTES

you find the file you're looking for quickly, and without using valuable connect time

Here is the fastest way to download a PC Magazine program:

- Log on to PC MagNet.
- Enter GO UTILITIES or choose (3) Search for PC Magazine Utilities and programs from the top menu.
- Choose (4) Direct Utility Download
- Enter the filename (or just the first four letters)
- Select the file from those presented.
- Read the description of the file. Answer (Y) to Do you wish to
- download this file? ■ Press the Enter key to see transfer
- protocol options. Choose a protocol (see sidebar "Choosing a Download Protocol").
 - Download the file

If you need further help downloading from PC MagNet, just call Customer Service. Representatives are available from 8:00 A.M. to midnight Monday through Friday, and from 2:00 P.M. to midnight on weekends (Eastern Standard Time), Holiday hours will vary. To reach Customer Service call (800) 848-8990 within the contiguous United States, except Ohio. From within Ohio or from outside the United States, call (614) 457-8650.—Christopher Barr

UPLOADING TO PC MAGNET PC MagNet makes many things easier for our readers, including sending Productivity

- column submissions. The Upload a Submission to PC Magazine section includes: ■ Power Programming, for C and
- MASM programming suggestions
- Spreadsheet Clinic, for spreadsheet macros and formulas
- User-to-User, for DOS batch files and DEBUG scripts
- Power User, for application program
 - and hardware tips ■ Languages, for BASIC, Pascal, C. FORTRAN, and COBOL
 - PC Tutor, for inquiries about general DOS and PC topics
- Connectivity Clinic, for networking
- suggestions ■ PC Advisor, for hardware and software
- purchasing advice
- Letters to the Editor, to state your comments about articles. (To write a letter online rather than upload a file, use the "Type a Letter to the Editor" facility.)

Your name and address should be included with all submissions. Questions sent to the advice columns are forwarded to the editors for publication. And for an even faster reply, post a message in one of the forums.-Michael Cohn



Free up your credit for other purchases while putting Northgate computing power at your fingertips.

Northgate gives you credit

Introducing... the Northgate "Big N" Revolving Credit Card NORTHGATE COMPUTER SYSTEMS, INC.

JOHN J DOE

Not a lease—

Works just like your VISA, MasterCard, American Express or other card.

Just fill out the "Big N" credit information. Send it in at once.

Prompt approval...your credit limit is based on your credit worthiness. Then call Northgate.

One of our expert system consultants will help design the system that best meets your needs. Then just say...

CHARGE IT!

Northgate offers flexible long-term lease plans too. Suited to fit your needs. With up to five years terms, if cash conservation is your concern, ask about leasing your system with Northgate. PHONE NORTHGATE NOW...

a. Your Personal Inf	ormation			Requeste	d Line of Credit \$			
Your Hame: First	Intial	Last	Date of Birth:		Social Security Humb	er:		
		Mo.	Day	W				
Present Address Street	Apt #	City	State	Zip	Home Phone			
					()	-		
Date of Residence: Mon	rth Year					Buy	Rent	Oth
			Monthly	Payment: S				
Previous Address:				Dates of				
				Residence:	From	To		
Your Employer: (If self-employed,		d Employment:	Position:	Monthly Income: Genes S Net S				
Employer's Address: Street		Mo	State		Rusiness Phone:		Not 5	_
Employers Address: Street		City	State		Business Phone:	-		
Previous	Address:			Dates of				_
Employer:				Empleyment:	From	To		
Income from alimony, child support or separate insintenance payments need net be disclosed if you do not with	Other Income:							
to have it considered as a basis for	I have received since			Monthly It	ncome			
repaying this obligation	(Date)			Gross \$	Net			

Let Northgate start building your computers...TODAY!

Use Our Toll Free Order Number

1-200-5/12-1003

New Canadian Toll-Free Order Hotline 1-800-338-8383 Hours: M-F 7am-8pm CST, Sat. 9am-3pm CST



From Canada and Foreign Countries call:

Corporate Headquarters: (612) 553-0111 - FAX (612) 553-1695

IT TAKES GENIUS TO MAKE POWER PERFORM LIKE THIS.



BEAUTY. GRACE. CLASS

- the fine art of creating micro-

computers so powerful you'll want to applaud their genius. The people at PC Designs engineer high-quality, highperformance equipment that is leaving the competition flatfooted. And their Service and Support, including SorbusSM maintenance contracts, are without equal. Everything done by PC Designs is done with class and innovation. Consider their new GV386PLUS as just one premier example -Speed, Expandability, and Memory configurations. And a price that will leave you room for shopping for their other options, such as high-powered hard disks and printers When you need to take that Next Step in computerization. call PC Designs. They're the

PUTTING THE POWER IN YOUR HANDS

people who know how to make

power perform.

CALL US AT 1-800-322-4872

(outside Oklahoma)

MICRO 286 - \$985.

- 80286, 10MHz
- . 512Ke, zero wait-state · 1 serial, 1 parallel port
- 1.2MB or 720KB floopy drive · 101-key keyboard

6V 286' -\$1299.

- 80286, 12MHz
- . 512KR zem wait-state
- a 32KR RAM cache
- · 2 serial, 1 parallel port . 1.2MB or 720KB floppy drive
- · 101-key keyboard * PC Magazine's 'Editor's Choice' on October 13, 1987 Ranked F in PC Meet's Poll of Corporate Satisfaction, October 17, 1988

OV 386/16 PLUS - \$2399.*

- 80386, 16MHz
- . 1MB, zero wait-state . SAKE BAM cache
- · 2 serial, 1 parallel port
 - . 1.2MB or 720KB floppy drive
- . WEITEK & 80387 support
- . Up to 16MB of 32 bit memory *FCC approval pending

6V 386/20 PLUS - \$2799.*

- 80386, 20MHz
- . 1Me, zero wait-state
- 64KB RAM cache
- · 2 serial, 1 parallel port
- 1.2Me or 720Ke floppy drive . WEITEK & 80387 support
- . Up to 16Me of 32 bit memory

VIDEO

- . Mono card and monitor \$175
- EGA card and monitor \$589.
 VGA card and NEC MultiSync II \$909.
- HARD DISKS
- Priam ID45H (45MB, 28MS) \$489
- Priam ID62 (70MB, 28MS) \$659.
 Priam ID130 (160MB, 28MS) \$1425.
- Maxtor AT140 (140MB, ESDI, 11MS) \$1799.



HOURS - 8:00-6:00 CST, Monday-Friday 9.00-3.00 CST, Saturday CALL US AT - 1-918-251-5550 (in Oklahoma) 1-918-251-7057 (Fax) BBS ON-LINE 24 HRS - 1-918-252-9137

All prices are subject to change without notice

2500 N. Hemlock Circle • Broken Arrow, OK 74012

CIRCLE 372 ON READER SERVICE CARD

LANDSCAPE MODE TO THE RESCUE



You can save time and paper printing out program listings and other ASCII files on your LaserJet. This handy formatting utility puts two full pages on a single sheet.

as ream after ream disappears into the maw of your laser printer, you may find yourself mordantly recalling that not long ago people confidently predicted the coming of the "paperless office." It's so easy today to print out a fresh copy of a slightly modified file that laser printers are becoming an ecological threat.

You can simultaneously salve your conscience and speed your work, however, by using LASERLST. This utility formats text files so that two 66-line by 81-character pages of information are printed out side by side on a single page, as Figure 1 illustrates. The result does more than cut your paper costs in half. In many applications, such as tracing through program listings or editing rough drafts that may need reorganization, it's important to put as much information as conveniently possible on a single page so that you can see it as a whole.

To give credit where it's due, the idea for LASERLST came from PPRINT, a shareware program created by Norm Patriquin. PPRINT is available for downloading from many user BBS and offers many additional capabilities. LASERLST concentrates simply on accurately emulating PPRINT's 2up facility.

As explained in the accompanying sidebar "LASERLST by Modem," a ready-to-run copy of LASERLST can be downloaded from PC MagNet. Its assembly-language source code, LASERLST. ASM, is printed here, as is the listing, LASERLST.BAS, which will automatically create LASERLST.OM when you

run it once in BASIC. Both LASERLST
.ASM and LASERLST.BAS can also be
downloaded from PC MagNet.

USING LASERLST In order to use LA-SERLST, you must have an HP LaserJet or compatible printer. The program itself is approximately 1,500 bytes long, though it may actually require up to 36K while

running. The command syntax for LA-SERLST is

[d:][path]LASERLST infile [outfile] [/Tn]

The *infile* parameter is the DOS filename to be printed by LASERLST. This parameter may be a fully qualified filename; that is, it may contain the drive and path where the file(s) can be found. For ease in print-

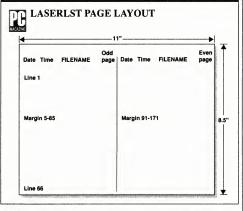


Figure 1: This is the page format used by LASERLST to print two regular pages on one page in landscape mode. Using LASERLST will help you cut your paper costs in half.

UTILITIES

ing multiple related files, the *infile* parameter also supports the DOS wildcard characters (* and ?).

The optional outfile parameter is the DOS filename (or device) where the output is to be sent. If you omit this parameter, LASERLST simply sends its output to the standard printer device (officially, DOS handle 4), which is normally your LPTI port. If your laser printer is hooked up to LPT2, just specify LPT2 as the out-file. Or, by supplying a drive and legal filename as the outfile parameter, you can save the output (which includes the necessary formatting codes) on a diskette that you can be a goodler machine to which a

laser printer is attached. There, you can use the DOS

COPY outfile PRN

command to print the file.

The optional /Tn switch is used to tell LASERLST the width to allow for tab stops. By default, tab stops are set to 8, as in DOS, but you can supply a value of up to 16 for n.

There are a few caveats to observe when using LASERLST. First, the file to be printed should be a pure text file. That is, the file should contain only printable characters, carriage returns (13 decimal, 00 hex), line feeds (10 decimal, 0.4 hex).

backspaces (8 decimal and hex), tabs (9 decimal and hex), and form feeds (12 decimal, OC hex). Including other characters—especially escape sequences that would affect a laser printer—may make the output unreadable. On the other hand, some word processors' formatting codes will simply print out in their ASCII form where they occur in the text without otherwise affecting LASERLST's output.

Second, as a general rule, the file should not contain printable lines longer than 81 characters. Longer lines will be broken after the 81st character, and the remainder will be printed on subsequent lines, as necessary. Usually, LASERLST

	PAGE	75,132 "LAMERAST - List file to MP LeserJet"	MAIN	PROC		; stert of program
ro.	-	PARA PUBLIC 'CODE'		CALL	INIT	; initialism program
· Eu	ASSUNE	CSICHEG, DHICSEG, ESICSEG, ESICSEG	MAIM10:	CALL	OPEN NAIMOO	; open the input file ; if we can't try next
TARTI	JHP	MAIN go to start of program	HAIH20:	CALL	READ	; read e block
EADER_HSG	DIE	"LasarLet 1.6 (c) 1989 Hiff Communications Co.", SDN, SAN "PC Magazine", 254, " Michael Holmes & Bob Flenders", SDN, SAN		CALL	PRINT	; print the line
CRLP	DIE	9DR, 9AH *\$*		OR JWR	NI, NI HAIN20	g q. end of file?
Initial	sed work	areas.		HOV	ME, PHANDLE	; ba = input file hendle
	Part	e : addr of first argument		960V	AH, JEH 21H	; ah = close file
ARG1 ARG2	DM	p ; addr of first argument p ; addr of aecond ergument		167	418	; ., ask bus to do it
PHANDLE	DM		MATHERI	HOV	AR. 478	s sh = find ment file
TABCOL	DM	e i tab width	- MANAGE I	187	218	g, file found?
HEWPAGE	DH	f new page requested flag		JWC	MAIN10	1 e. ves continue
HPSTATE	DS	# printer state (1 = initialised)				
TITLE_	DIE	1MM, "Add" ; title line for heading		HOV	DE, OFFSET DOLLAR DIS	; dx -> sull mesaege ; say goodnight
TITLE DIE	DIE	*mm/dd/yyyy * ;and display				
TITLE THE	DS DS	"hh:mm Pilename: " 19 dup(32)	MAIG	ENDP		
TITLE DEP	žQU	\$-TITLE DIE	tatt	Handle	initialisation	
	DB	Page*				
TITLE PGE	DS	"xxxx",@dh.@ah.@ah	INIT	PROC		
	DH	1HH, "4d0"				
TITLE_LEN	EQU	\$-TITLE_ ; length of title		CLD		; esqure mecending
, -				MOV	AH, 19H	; ah - get corrent drive
DTA atr	acture fo	or DOS "find matching" call		INT	218	; el = current drive
		ADM . dta offeet		MOV	EDHV, AL	seve entry drive
DTA_ATTE	EQU	99H ; dta offset HYTE PTR DTA+21 ; file ettribute				
VIA ALTS	EQU	WORD PTR DTA ATTR+1 : file time		WOW	HI, OFFSET EDIN	; si -> current directory ar
DTA TIME	EQU	WORD PTR DTA ATTR+1 ; file time WORD PTR DTA TIME+2 ; file date		IRC	NYTE PTR (NI), '\'	; ,, start with backslesh
DTA LEIS	EQU	WORD PTR DTA DATE+2 : file lew of size		ROR	DL. DL	: dl = defeult drive
DTA MHIE	EQU	WORD PTS DTA LETT+2 + file may of size		HOW	AH, 47H	ah = get currect dir
DIA HAHE	EQU EQU	HYTE PTR DTA MBIE+2 : file name of file		INT	AH, 47E	; an = get currect dir
DTA LEB	EOU	DTA NAME+15-DTA : length of dta find entry			***	,
1				NOV	DE. OFFSET HEADER MSG	: dx -> heeder messece
Messege	s to use	r .		MOV	AN. 9	; ah = priot escii\$ message ; esk DOS to do it
				INT	218	; esk DOS to do it
FILESF	DB	"File not found.", SDN, SAY, "\$"				
PRTOERR	DH	"Could not open output file.", SDN, SAN, "S"		CALL	PARKS	check parameters
FORMAT	DIE	SON, SAH, "HYNTAX:", S9N, "LASERLST [d:][path]fileneme(.est] "				
	DB	"[outfile] [/Tn(", SON, SAN, SAN		CHP	ARG2, Ø	q. arg2 specified?
	DM	" ofile defaults to LPT1:", SON, SAN " n is tab width (16 max)", SON, SAN, "\$"		JE	181720	; e. yes akip open
	v=	- n is can aidcu (ie max)-'anu'awu'-b-		wow	DE, ARG2	: dx -> arg2 value
MP cont	rol stri	ngs		HOV	AH, 3CH	; ah = create file
) AF CONC				XOR	CE, CE	: cs = file ettributes
ETRINGL	DB	188, "8", 188, "6110", 188, "(s178", 188, "615.14C"		INT	218	g. open the file ok?
	DM	lmm, "m", lmm, "sllo", lmm, "(sl7m", lmm, "415.140" lmm, "sl71F", lmm, "416E", lmm, "m-3m" lmm, "sma", lmm, "sm59m", lmm, "4-651", 80m		JWC	INITIO	; e. yes contique
	DM	1BH, "4m8a", 1Ha, "4m85H", 18H, "4e5L", SON				
NTSINGL_LEN	RQU	\$-HTHIGG1		HOW	DE, OFFSET PRTOERS	1 qx -> obes error meseede
STRING2	D.W	8ch.188.*8*		CALL	DIE	; you're deed, Jim.
HTHING2 STRING2 LEN		9ch,188,"8" 5_8791 MG2	191716:	MOV	PHANDLE, AX	; seve printer handle
DIMINAS_PRE	100	0-HIHIMAA		CALL	PHANDLE, AX	
EDNIET STREET	DH	188. "AASH", 188. "Aa988", 188. "Aa882.", SDN, SAN, SDN, SAN	INIT28:	CALL	DFLFATH	; set up dir & drive
HTGING) LEM	HOU	\$-NTHING3		MOV	AN. 4ER	s ab - find first
_				HOV	DE, OFFSET PILERAME	dx -> file to find
Taing4	DM	"[", SDH, SAH		EON	CX, CX	: Oa - search attribute
				INT	21#	g, find first file ok?
STRING5	DM	1HH, "&aSH", 1HH, "&e171H", 1HH, "&e91L", SDR		JMC	INITES	; a. yes continue
STRINGS LEM	HOU	S-NTRINGS				
				1604	DM, OFFSET FILENF	; dx -> file not found
STRING4	DH	#CH, 1HH, "&e#H", 1BH, "&e#5M", 1HH, "&e5L", #DH		CALL	DIE) gasp you're final breat
TRINGS_LES	MOU	\$-NTRING\$				
,			INITSO	RET		; return to caller
		of program				
			INIT	ENDP		

LASERLST.ASM: The assembly-language source code for LASERLST.COM, which enables you to print two pages of text files on a single sheet of paper by using your laser printer's landscape mode.

Either Way You Look at It, Peachtree Accounting Saves You Money.



When it comes to accounting software, no one offers you more for your money than Peachtree. Now we're offering you two ways to buy our best-selling accounting software - and two great ways to save.

Peachtree Complete™ II is our premier business accounting system. Designed and sold as a \$5,000 accounting system, the latest version of Complete ii represents a vastly expanded and greatly improved package that sells for an unbelievably low \$199. Find out what over 250,000 satisfied users already know - no other accounting system offers so much for so little.

And now, for businesses who want to make the most of their accounting information, Peachtree's Double Bonus Bundle gives you Peachtree Complete II Accounting plus its own custom reporting tool, Peachtree Data Query II Enhanced. The Double Bonus Bundle includes

both systems - regularly priced at \$199 each - for just \$298. That's a sayings of \$100! Either way. Peachtree offers you the most accounting you can get for your software



PEACHTREE'S DOUBLE BONUS BUNDLE

Includes Peachtree Complete II plus Peachtree Data Query II

IUST

\$298 **SAVE \$100**

With PDO II Enhanced You Can: · Create on-screen inquiries to display data

- · Present data in line or bar graphs
- · Use any of over 20 pre-defined reports · Modify pre-defined reports and save
- the formats

And More!

A Recent Survey by the American Institute of **CPAs Reports More** Accountants Use and Recommend Peachtree

Than Any Other

Accounting System!

Peachtree Complete II is a comprehensive accounting system developed to meet the needs of small- to medium-size businesses. It comes with eight high-power modules that may be used individually, or fully integrated for maximum accounting efficiency:

- · General Ledger
- · Accounts Receivable
- · Accounts Pavable Invoicing
- Inventory · Fixed Assets · lob Cost
 - Pavroll

And Peachtree Complete II is designed using the latest software innovations, like full-color scrolling reference tables, pop-up windows, and short-cut keyed menus. We've expanded to

allow an unlimited number of companies, added service invoicing, range printing, and more, Peachtree Complete II's error handling is quick and easy, with plain English messages and suggestions. Context-sensitive Smart HELP is on-line, all the time. And as always, Complete II comes with the most thorough documentation - a separate quick-start Installation Guide, Accounting Primer, seven-volume Reference Library, and extensive on-line tutorials on each module - all at no extra charge.

Now you can extend the power of your Peachtree accounting to include custom reporting and analysis, and save even more money! Order the Double Bonus Bundle and you'll get

Peachtree Complete II, plus Peachtree Data Ouery II Enhanced, for just \$298. PDQ lets you turn raw figures into highly sophisticated reports, allowing you safe, easy access to valuable information from all eight Peachtree Complete II modules. PDO's simple, clear approach gives you maximum control and flexibility. You tell PDQ what information you need, and PDO

looks through your accounting files, finds it, and presents it to you any way you want it - on screen or printed, as a graph, in report form, or ready for export to another software package. You can begin creating reports in just minutes, thanks to all new user instructions and online practice sessions that lead you through the system and build confidence as you go. With Peachtree's Double Bonus Bundle, accounting and custom reporting go hand-in-hand, and that

makes good business sense. MONEY BACK GUARANTEE. We stand behind Peachtree Complete II and PDO II with a tollfree hotline for technical support (\$1 per minute, \$20 minimum on your credit card) and a 30-day money-back guarantee when you buy directly from Peachtree. If for any reason you're not satisfied.

you can return your package within 30 days for a prompt refund. That's the Peachtree Software promise. A \$25 restocking fee applies to all returns.

Peachtree Complete II: the Business Accounting System for just \$199, and Peachtree's Doubie Bonus Bundle for just \$298. Either way you look at it, Peachtree Software saves you money. Order today!

HARDWARE SPECIFICATIONS: Requires PC/MS-DOS version 2.0 or higher with 364K of usable memory (\$12K required with DOS 3.3) and a minimum 10 MB hard disk. For use with the 18M⁹ PC, PC XT, PX AT, Personal System/2^mand compatibles, 3 M° media optionally available. Not

Lotus 1-2-3 is a registered trademark of Lotus Development Corporation. dBASE is a registered trademark of Ashton-Tate Corporation. IBM is a registered trademark and Personal System/2 is a trademark of international Business Machines.

PEACHTREE COMPLETE II

STILL ONLY \$199

And More!

Call Now to Order 1-800-247-3224

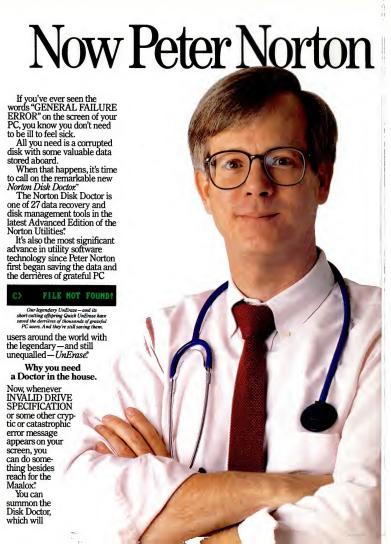
(or call 1-404-564-5800)



To Order by Mail Add \$12.50 Shipping and Handling? (In Georgia add applicable sales tax.)

Peachtree Software

4355 Shackleford Road, Dept. PCM, Norcross, Georgia 30093 * Telephone number required on all orders.



makes house calls.



The Standard Edition gives you UnErase, the new Norton Control Center

and a range of features, functions and enhancements. Doctor can diagnose and repair everything from bad partition tables and boot records to mangled root directories. It can even reformat bad sectors and write back the old data.

determine

nature of the

problem, re-

most cases, fix it for you.

All by

The Disk

itself.

port it and, in

the exact

Automatically

In fact, if the Doctor can't cure your corrupted floppy or hard disk, then Buster, you've got one corrupt disk.

In which case, you'll need to refer to The Norton Troubleshooter, a 158-page guide to finding and fixing most anything that

> could go wrong. Don't worry, you don't have to go to the bookstore or the library to refer to it, because the Troubleshooter is included in

> > the Advanced

Edition. Frankly, the Norton Disk Doctor and the Norton Troubleshooter are worth the price of the new Advanced Edition all by themselves.

But, of course, they aren't by themselves.

They're accompanied by a wish list of features, functions and enhancements sufficient to satisfy the yearnings of all those people who've been politely writing and calling to request them.

The people's choices.

Like Speed Disk. the world's most powerful disk tuning tool, which features four user-selectable optimization methods and doesn't lose vour data if you lose power.

And Format Recover, which can unformat your accidentally reformatted hard disk even if vou haven't taken any precautions beforehand.

Editions. The Norton Troubleshooter is

Our user interface, which InfoWorld said made the Utilities "as easy to use as possible," now comes with pop-up windows and dialog boxes.

Our new Norton Control Center lets you define or alter a range of system settings-from cursor size to screen and palette colors—quickly and easily.

While our Disk Test finds and marks faulty areas on your disk to help you protect your data before you have a chance to lose it.

If you want to lose it, however, you'll be glad to know that WibeFile and

WipeDisk support DoD 5220.22-M 116c(6b), the Pentagon's latest data security specification.

Which means they'll erase your files so thoroughly not even Peter Norton can find them.

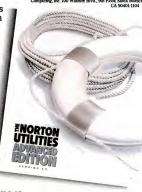
You'll find the latest Norton Utilities at your

favorite software dealer. If you haven't got a

favorite software dealer, take two aspirin, call us right away at 1-800-365-1010 and place an order.

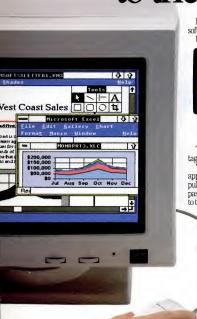
yours with the Advanced Edition The Doctor will be on its way in no time.

All Utilities now support large hard disks under LNG 9.N., COMPAQ DOS 3.31, and the PC-MOS/386 multi-tasking operating system. Designed for the IBM PS/27 and PC families and 100% compatibles. © 1988 Peter Norton Computing, Inc. 100 Wilshire Blvd., 9th Floor, Santa Monic CA 90401-1104



CIRCLE 302 ON READER SERVICE CARD

Push your software to the limit.



If you want to get the most out of today's new, high-powered software applications, we have a few words of advice:

Use a Microsoft Mouse



The Microsoft Mouse gives you easy access to all the powerful features today's software has to offer.



It looks innocent enough here, but wait until you see how the Mouse makes your software scream.

The Mouse can unleash your software—and take full advantage of the features intended to make your work easier.

With the Mouse you can effortlessly manipulate menu-driven applications without taking your eyes off your screen. You can pull down menus. Highlight text in one fell swoop. Copy, cut and paste formulas in spreadsheets easily. And move things from here to there without any command-key mumbo jumbo.

Literally hundreds of applications support the Mouse. But as the leading software developer for personal computers (and one of the first to bring a graphical interface to PC screens), we've gone a step further: Microsoft Windows/286 with PC Paintbrush* for

Windows, Microsoft Paintbrush or EasyCAD**2 actually come with the Mouse (or vice versa).

Already, the Microsoft Mouse has made its way into the hands of over one million personal computer users. And that number is sure to grow even faster. After all, graphically oriented software is the driving

force behind improved productivity.
But it's the Microsoft Mouse that puts you in

the driver's seat.

Microsoft®
Making it all make sense:

© 1988 Microsoft Corporation. All rights reserved. Microsoft and the Microsoft logo are negistered trademarks and the Microsoft Moses design and Makingir tall make sense use trademarks of Microsoft Corporation. East CAD tise Handemark of Evolution Computing. PC Painstrucks is a registered trademark of 250 ft Corporation. For more information, call 1800-541-1261. Customers in Cannada call 1410 673-7638, custada Varia America, (200) 882-8601.

PRODUCTIVITY

OPEN -	Opene ti	ne next file to process an indicates file would not o	d update title line		HOV	DI, SI AL, 1AM	; di -> chers read ; el = XDP indicator
PEN	PROC	indicaces Lile would not o	pec.	REPHX	BCASS JNE	READ 60	; q. eof found? ; a. no continue
	MOV	DK, DFFSET DTA NAME	; dx -> file name		ISC	cx	; increment count
	NOV INT JMC	AX, 3D40B	; el = opec fir reed ; esk DOS to do it. ; nk continue		BEG	CX LASTSUPP, 1	: and negete it : and set lastbuff fleq
		DPEM05		READER	ADD		
	RET		; else return if error		JHS	CX, SX READ90	; q. any bytes this buffer? ; e. yee continue
PENOS:	VON	FHAMDLE, AX LASTBUFF, 8	; seve file bendla ; show lest buffer not reed		MOM	82, Ø	; a. else show end of file.
				READ90:	POP	DE	; restore registere
	NON	SI, OFFSET DTA SAME DI, OFFSET TITLE_FLX			POP	ex AX	
	HOV	AL,	; al = blenk		RET		end return to callar
REP	PUBB MOV MOV STOSE	CX, 15	; seve it; ; el = blenk; amount to blenk; clear the file name	READ	ENDP		
	POP	DI	; restore output poloter	: PRIST	- Print:	equested date string to priot or #.	ce = length of input string
PEB10:	LODES		; el - byte from file came	PATR7	PROC		
	DR JE	AL, AL OPENZO	; q. end of name? ; e. yes end loop				. a and of file sells
	STOSE				OR Jex	SI, BI PRINTIS	; q. end of file csll? ; e. no continue
	JMP	OPES10	; store e byte ; and move next		CALL	EPILOGUE	; put out trailing pheracters;end return to callar
02828:	NOV	BL, '8'	; fill value				
	PUSB	AS, DEIDTA_DATE	fill value ; ax = deta field ; seve for later ; equio	P81H710:	PUSH	AX 68 CX	; mava registers
	PUGG				PUSS	DX	
	SER AND	CL, 5 AX, CL AX, 8PH	; cl = sbift velus		PUBE	sı	
	AND	AX, OPH	; cl = sbift velus ; mm to lower bits ; upper bits off ; cx = number of cheracters ; di -> mm ; move in mm		CHP	SPSTATE, 0	; q. initiel etete; ; a. no comtinue
	HOV	CE, 2 DI, OFFSET TITLE DTE	di -> mm		CALL	PRINTZE	; send out initial string
	POP AND NOV NOV	AX, 1PK	; es = date ; el = dd	PSINT20:	MOV	EXPAND DB, BI	; handla teb espansion ; dx -> stert of new buffer ; be = mbr of chers in buffer ; ce = mbr of chers to print ; eb = prioted chers in this line
	WOW	CX, 2 DI, OFFSET TITLE DTE+3	; cs = number of chars ; di -> dd		NOV	DS, SI SX, CX CX, CX	; be = mbr of chers in buffer ; ce = mbr of chers to print
	CALL	ITOA	: move into dd	!	NOV	AX, USEDLEN	
	POP	AX	; as = data ; cl = shift amount	PRINT38:	LODES		; al = first character
	HOV SER ADD HOV	CL, 9 AX, CL AX, 1980 CX, 4	; as = yy		CHP	AL, SCB PRINT4S	; q. formfeed? ; e. yes process it
	MOV	AX, 1960 CX, 4	; es = yy ; ee = yeer ; ce = length of output				
	CALL	DI, OFFSET TITLE DTE+6	; di -> yyyy ; move ieto yyyy		CALL	LINEPST PAGESREAK	; priot the line ; do a page brank
	WOW	AX, DS:DTA_TIME	*!		XOR	AX, AX	; ah = mbr of columns used ; be = decrement remaining count
	HOV PUSS HOV SIR HOV	AX, DEIDTA TINE AX, CL, 11 AX, CL CX, 2	1 save for later		DEC INC JHP	DX PRINT?0	priot the line do a page braak ah = mbr of columns used be = decrement remaiding count ds -> nest printable cheractar and continus w/common code
	SHR	AX, CL	<pre>j c1 = ehift velue j sx = bb j cx = laogth nf output j di -> hh</pre>	PRINTARI	СИР		
	HOV	DI, OFFSET TITLE THE	i di -> hh i move iato hh	7020.40	JHE	AL, GAN PRINTSS	; q. linefeed? ; e. no continus
	POP				DEC	BX CX	; be = remaining chare in buffer ; cs = mbr of charecters to print
	HOV	AX CL, 5	; ex = time ; cl = shift welue		CALL	LIMEPRY	print the line ah = mbr of molumns used
	AND HOV	AM, CL AX, 3FR CX, 2	; ax = me ; upper hite nff ; ce = length nf output		CALL	AH, AH SUMPLISK PRINT?S	; increment/test line counter ;and continue w/common code
	NOV CALL	DI, OFFERT TITLE_THE+3	; ce = length of output ; di -> mm ; move into mm		JMP		
		ITOM		PBINT50:	CKP	AL, #DS	; q. narriege return? ; e. no continue ;and continue w/common code
	NOV NOV NOW	AX, 408 SX, 1 CX, TITLE_DEP DX, OFFSET TITLE_DTE	; eh = write to device ; be = stdout device ; cx = length to display ; dx -> part of header line ; iesue dos cell		JMP	SHORT PRINTS7	;end contions w/common code
	NOV	CX, TITLE DEP	cx = langth to display	PBINT55:	CHP	AL, SSH PRINTES	; q. BackSpace? ; s. no continue
	INT	218	; iesue dos cell				a nove back a column
	WOV	AX, 408	; eb = write to device		JWS	AX PRINT65	: but not beyond firet
	VON VON VON	AX, 408 8X, 1 CX, 2	be = stdout device ce = length to displey dx -> <cr><lf> strioq issue doe cell</lf></cr>	PRINTS7:	XOR	AX, AX SHORT PRISTS5	; ah = start of line ; end continua
	THI	DK, OFFSET CRLF	dx -> <cr><lf> dx -> <cr><lf> etrloq ; issue dos cell</lf></cr></lf></cr>		JHP		
	CLC		s show all went ok	PRINTED:	ISC	AX CX SX	; increment nbr of columns used ;and nbr of chars to print
GEN98:	RET				DEC		;and nbr of chars to print ; decrement remaining char count
928	ENDP				CKP JL	AH, 01 PRINT70	; q. reached end of line? ; a. no continus
READ -	Reed the	neet buffar full	leasth of Man		CALL	LTHEFAT	
Xelt	PROC	naxt line, 0 if eof, ce =	sergen of 1180	1	PUSS PUSS	CX DS	print upto page width
2.40				1	HOY	DX, OFFSET CRLF CX, 2	; dx -> <er><lf></lf></er>
	PUSS		; seve registars	1	HOV CALL		; ce - string length ; print the crif to do line wrepp:
	PUSE	DX		1	POP	De Ce	restore ragisters
	HOV	er, m	; si -> oothing		CALL	AX, AX SUMPLING	ah - mbr nf cnlumns used increment/test line counter
	CMP JE	LASTRUPP, 1 READSS	; q. lest buffer heve leh? ; a. yes end it all	PSINT76:	DR	ex. ex	g. snything left to check?
				1	JWE	SX, SX PRISTIP	; q. snything left to check? ; a. yes loop till done
	NOA	SX, PHANDLE	; be - handle of file to reed		CALL	LIBOPRT USEDLEN, AR	; print the line ; seve mbr of columns used
	HOV HOV HOV IST JC	AK, 63PH SX, FHANDLE CK, SUFLES DX, DPPSET BUFFES 21S	; ah = read file ; be = handle of file to reed ; ce = amount to read ; dx -> buffar ; rand, plans ; error . raturn eof	1			
	JC	21 S READ90	; rand, plasss ; error raturn cof		POP POP	SI DX	; restore registera
	08				POP	DX CX SX AX	;
	32		; q. eny reed? ; s. yes return with something		POP	AX	and return to caller
	WOV WOW	BI, OPPBET BUFFER	; si -> start of lice ; cs = mbr of characters reed ; end be	PRINT	ENDP		
	HOV	CX, AX	; ca - nor of characters reed	POINT	ENDP		

UTILITIES

Entr	PROC	error message and ret error message ended in	doller sigh.	DFLPATB16:	CHP	BYTE PTR [DI+1], 's' DFLPATH20	g q. drive apecified? g a. no use current drive g dl = drive to use g get requested drive number g est requested drive g vis dos
×				1	HOV	DL, (DI) DL, 'A' AM, GER 21R	dl = drive to use
	INT	AM, 9 21.0	; sh = print atring ; call dos to print error	1	EUB	DE, 'A'	; get requested drive number
				ŀ	NOV	2111	; via dos
	HOV	DL, XDRV AN. #XB	; dl = drive to select ; sh = select drive	1	ADD	DI, 2	1 or -> mare bare
	INT	AH, SEB 21E	ah = select drive	DFLPATE28:	PUER	DI EX, DI	<pre>; aave pointer ; bx -> atart of area ; al = aearch for null</pre>
	MOV	DX, DFFBXT EDIN	; dx -> directory	1		AL, AL CK, 128	; al = search for null
	HOV	AM, 3EM 21E	eh = CSDIX request		HOV	CX, 128	; very max to seerch
	INT			REPNE	SCASE		; find end of arg
	MOV	AX, 40808 218	; ex = exit ; terminate routice		LEA	BI, [DI-1]	; ei -> mul
	INT	21×	; terminate routice	1	SCASE LEA HOV CHP	SI, [DI-1] CX, B EI, EX	; find end of arg ; ei -> nul ; cx - \$ chara to move ; q. any file name ; a. no error
X.	EEDP				JE	DFLPATERS	j a. no error
PARMS .	Parana	the command line		DFLPATE38:	DEC	m1	; ai -> prev cher ; q. dir?
and a	PROC				JE	DFLPATB35	i q. dir?
JUS				1		cx	; q. dir? ; e. yea end of file name. ; cx = char count ; q. dome? ; e. yes move file name
	CALL	UPCASE	; upper case the parm area ; ai -> parms erea	1	CHP	EI, EX DFLPATR37	j q. done?
	MOV	EI, ØIE	; al -> parms erea		JHP	DFLPATES?	: continue
ARMS10:	LODES		; get parameter character				
	JE JE	AL, '/'	; q. option?	DFLPATE35:	IEC	BI CK, CK	; at -> atart of file name ; g. file name spec'd?
		AL, FOH PARMSSS	; get parameter character;] d. pyton.check option] a. yes chick] a. yes exit] d. blank;] a. yes sxip ; a. yes sxip ; ast the argument] die on ao error	J	JE	DFLPATESS CX, 12	; ai -> atart of file name ; q. file came spec'd? ; a. no . error ; q. too long? ; a. yes error ; save atart pointer ; di -> file came
	JX	PARMS58	a. yea exit	1		CX, 12 DFLPATERS	; q. too long?
		AL, PARMS18	; q. piank? ; a. ves skip	1	JA	EI.	; save atart pointer
	CALL	ARG PARMETER	; aet the argument	1	HOV	DI, OFFERT PILENAME	; di -> file came ; assure cul moves too
	Je	PARKERR	1 die on so error	REP	MOVEE	••	; move in the file name
JUG 3 8 :	LODES			1	POP	EI	: . sove in the file name ; reatore start pointer ; . and dir pointer
	JE JE	AL, SDE PARKSSS	q. end of line?		CHP	DI BI. EX	; end dir pointer ; q. at atart of parm?
	CMP	AL, '/' PARMS80	get next character get end of line? a. yea proceas get atart of option?	1	JE	DFLPATHPS	; e. yes return
	JE CHP	PAJUIS 88	g. atart of option? a. yea process g. end of PARMS?	1	IRC	er, ex	; Dx -> next cher
	JA	PARKETS	; q. end of PARMS? ; a. no next char	1	CHP		; . and dir pointer; ; q. at atart of parm? ; e. yes . return ; bx -> next cher ; q. root only given? ; a. yes continue ; ai -> last \
	CALL			1	DXC	81	; a1 -> leat \
	JHP	EMDPARH PARHS 18	; terminate parm string ; look for cest	DFLPATH45:	MOV	DYTE PTR (EI), 6 DX, DI AM, 388 218	; make dir ASCIIS
				DFLPATH50:	WOV	DX. DI	; dx -> directory ; ah = CHDIR opcode
JUS58:	CALL	ENDPARM	; terminate parm atring	ì	INT	219	; an = CRDIN opcode ; change directory ; if ok continue ; dx -> baddir request
	CKP	ARGI, 8 PARKSERR	; q. PARMS 1 available?	1	JHC		; if ok continue
	JE RET	PARKSER	; a. no error ; else return to caller	1		BBORT DFLPATHS5	
				DPLPATHOS:	CALL	DX, OFFSET FORMAT DIE	; dx -> no file apecified
UNSER!	LODSE	EHDPARM	; terminate parm atring ; al * option character	DFLPATBES:	HOV	DIE DX, OFFSET FILENP DIE	; dx -> iovalid filename apec'd
	JWE	AL, 'T' PARMSERR	; q. Tab width; ; a. no error in option		CALL	DIE	
				DPLPATB98:	RET		; return to caller
	CALL	ATOI	; ax = tab widtb	DFLPATE	****		
	CHIP JG	AX, 16 PARMS18	; q. request greater than max? ; a. yes unressonable	1			
	36		; a. yea unreasonable			e tab expansion	
	HOV	TARCOL, AX PARMS18	; save tab width	1 41	-> line	read from file ended b	y a linefood
	JMP		; continue acan	Full	a faud	to of line	
RHSERRI	NOV	DX, OFFSET FORMAT DIX	dx -> format meanage	3 61	-> refo	rmatted line in output line length	buffer
	CALL	DIX	; abort	1	- nev	line length	
JUIS	EEDP			EXPAND	PROC		
ARC - 6	otup po	intere to the command 11			PUAR	AX	; aave registera
Entry	: ai ->	intere to the command li second character in are r ARG2 pointers filled i If more than 2 arguments	ument.		PURE	AX EX	,
Exit	ARG1 O	ARG2 pointers filled	n.		PUEE	DX	
Cal	ry set	it more than 2 midnments	detected.				
eg .	PROC			1	NOV	DI, OFFSET OBUFF	; di -> atart of output buffer
	LEA	sx, [SI-1]	; bx -> argument	EXPAND1#	LOOSE		; al - character from input lim
	CWR	ARG1, 6 ARG1#	g a arql filled in? g a yes check 2 g aave argl pointer		CHP	AT 489	
			; a. yes check 2	1	JNE	AL, 69H XXPAND36	; q. tab character? ; a. no continue proceeding
	LEA CMP JNE HOV	ARGI. EX		1			
	JNE HOV JMP	ARGI, EX SHORT ARGSS	: exit oki				
w18.	JHP	BHORT ARGS	: exit oki		NOV	AX, CURCOL	ax = column offaet
1018:	JHP CHP	ARG1, EX BHORT ARG9# ARG2, 8 ARG28	: exit oki		DEC	AX DX. DX	; ax = column offaet ; dx:ax = current column
10181	JHP CHP	BHORT ARGS	: exit oki		DEC	AX, CURCOL AX DX, DX EX, TABCOL BX	<pre>j sa = current column j ax = column offset j dx:ax = current column j bx = nbr of oolumna per tab i dx = apace within tab = ***</pre>
	HOV JMP CMP JE STC RET	ARGI, EX BHORT ARGSS ARG2, 8 ARG28	; exit ok: ; g. arg2 filled in? ; a. no fill it in ; else error ; and return to caller		HOV TOR	DX, DX EX, TABCOL BX	; sa = current column ; ax = column offast ; dx:ax = current column ; bx = nbr of columna per tab ; dx = apace withic tab etcp
	HOV JMP CMP JE STC RET	BHORT ARGS	; exit ok: ; g. arg2 filled in? ; a. no fill it in ; else error ; and return to caller		XOR HOV	DX, DX EX, TABCOL	; ax = column offset ; dx:ax = column offset ; dx:ax = current column ; bx = nbr of columna per tab ; dx = apace within tab etop ; bx = spacee left in tab atop
	HOV JMP CMP JE STC RET	ARGI, EX BHORT ARGSS ARG2, 8 ARG28	: exit oki		HOV TOR	DX, DX EX, TABCOL BX	; bx - spaces left in tab atop
1628 t 1638 t	HOV JMP CMP JE eTC RET HOV CLC RET	ARGI, EX BHORT ARGSS ARG2, 8 ARG28	g. exit oki g g. arg2 filled in? ga.nofill it in gelaeerror g. and return to caller gave arg2 pointer show no error	VV804028 :	HOV BUE HOV	AX OX, OX EX, TABCOL BX	; bx - space- left in tab atop ; al - apace char to pedding at
1G28: 1G98:	HOV JHP CHP JE STC RET HOV CLC RET EEDP	ANG1, EX	; exit ob! ; q. erg2 (filled in? ; a. no fill it in ; else error ; and return to caller ; anve arg2 pointer ; show no error ; teturn to caller	XXPAND20:	NON HOV IDIV	AX OX, OX EX, TABCOL BX	; bx - space- left in tab atop ; al - apace char to pedding at
1628: 1698:	HOV JHP CHP JE STC RET HOV CLC RET EEDP	ANG1, EX	; exit ob! ; q. erg2 (filled in? ; a. no fill it in ; else error ; and return to caller ; anve arg2 pointer ; show no error ; teturn to caller	XXPAND20:	BUE HOV SUE HOV STORE IEC	AX DX DX EX, TARCOL BX BX, DX AL, 28B CURCOL	<pre>; bx = space left in tab atop ; al = apace cher to padding at ; put a blank in output buffer ; bump current column nbr</pre>
1628: 1698:	HOV JHP CHP JE STC RET HOV CLC RET EEDP	ARGI, EX BHORT ARGSS ARG2, 8 ARG28	; exit ob! ; q. erg2 (filled in? ; a. no fill it in ; else error ; and return to caller ; anve arg2 pointer ; show no error ; teturn to caller	XXPAND2#:	BUE HOV SUE HOV STORE IEC	AX DX, DX EX, TABCOL BX BX, DX AL, 20B CURCOL BX EXPAND 28	<pre>; bx = space left in tab atop ; al = apace cher to padding at ; put a blank in output buffer ; bump current column nbr</pre>
NG28: NG98: NG EMDPARI Entry	HOV JHP CHP JE STC RET HOV CLC RET EEDP	ANG1, EX	; exit ob! ; q. erg2 (filled in? ; a. no fill it in ; else error ; and return to caller ; anve arg2 pointer ; show no error ; teturn to caller	XXPAND2#:	BUE HOV SUE HOV STORE IEC	AX DX DX EX, TABCOL BX BX, DX AL, 28B CURCOL	; bx - space- left in tab atop ; al - apace char to pedding at
NG28: NG98: NG EMDPARI Entry	HOV JMP CMP JE STC RET MOV CLC RET EEOP - Eand 1 41 -> FROC	ARCI, EX SANCET ARCOS AR	j. est obt j. say filled in; j. no. fill it in j. no. fill it in j. no creams to caller awa argl pointer j. now rewerer j. return to caller in a colon d d gammater	XXPAND26:	DEC XON HOW IDIV SUE HOW STORE IEC DEC JWS JMP	AX DX	; bx - space left in tab atop ; al - space char to padding at ; put a blank in output buffer; bump current column mbr ; q. done yet? ; a. no. keep looping ; a. yea get next character ; q. carriage refurn?
RG18: RG28: RG98: RG ENDPARM SERT: SDPARM	HOW JHP JE STC RET HOW CLC RET EEDP - Eand 1 al -> PROC CMP JHE	ANCI, EX SHORT ANDS ANCI, 6 ANCI, 6 ANCI, EX Le parameters which end first observer past es ENTE PTR [EI-2], '1' ENTRANNIE	j. eat out j. earl		DEC XOM HOV IDIV BUE HOV STORE IEC DXC JMS JMP CMP JE	AX DX	; bx = space left in tab atop ; al = space char to pudding at ; put = blank in output buffer ; bump current oolumn nbr ; q. done yet? ; a. no. keep looping ; a. yea get next character ; q. carriage return? ; a. yea reset column
NG28: NG98: NG EMDPARI Entry	HOV JMP CMP JE STC RET MOV CLC RET EEOP - Eand 1 41 -> FROC	ARCI, EX SANCET ARCOS AR	j. est obt j. say filled in; j. no. fill it in j. no. fill it in j. no creams to caller awa argl pointer j. now rewerer j. return to caller in a colon d d gammater	XXPAND3#:	DEC MON IDIV BUE HOW STORE IEC DEC JHS JHP CHP JE CHP JHE	AX D. DX	; bx - spaces left in tab atop; al - space char to pending at put a blank in output buffer; bump current column hbr; a. done; yet in space; yet in ye
NG28: NG98: NG EMDPARI Entry	HOW JMP CHP JE STC RET HOW CLC RET EEDP 4 - Eand (1 al -> PROC CMP JME HOW	ANCI, EX SHORT ANDS ANCI, 6 ANCI, 6 ANCI, EX Le parameters which end first observer past es ENTE PTR [EI-2], '1' ENTRANNIE	y earl out y early filled in) else error else error else error end error e		DEC MON IDIV BUE HOV STORE IEC DEC JHS JHP CHP JE	AX DX, DX BX, TARCOL BX BX, DX AL, 28B CUNCOL EMPAY DX EEFAND 28 EEFAND 28 EEFAND 38 AL, 8DE EEFAND 30 AL, 6CE	; bx - space left in tab atop ; al - space char to padding at ; put s blank in output buffer ; bump current online his ; q. done yet? ; a. no. heep looping ; a. yea get next character ; q. carriage return; ; a. yea reset column
NG28: NG38: NG ENDPARM ENLT: IDPARM	HOW JMP CMP JE STC RET HOW CLC RET EEDP G = Eand G = A FROC CMP JME HOW RET	ANCI, EX SHORT ANGS ANCI, 6 ANCI, 6 ANCI, 6 ANCI, 6 ANCI, EX (6 parameters which end first observer part or ENTRE FTM (EI-2), '1' ENTRANNIE STEE FTM (EI-2), 5	y any filled in y any filled in sine	XXPAND3#:	DEC XOS MOV IDIV BUK HOW STOSE IEC DXC JNS JNP CHP JE CHP JE CHP JNS HOW JNP	AX D. DX	jbx - space left in tab atop jal - space cher to padding at jout s bland in outque buffer joung current column infer joung current column infer ja. 600 ptg jung ja. 700 keep looping ja. 700 keep looping ja. 700 seet column ja. 700 feed ja. 700 feed ja. 500 coordine ja. 500 coordine ja. 500 coordine ja. 500 coordine
IG28: IG38: IG ENDPARM Entry IDPARM IDPARM18:	HOW JMP CMP JE STC RET RET HOW CLC RET EEOP C - Eand JE FROC CMP JME HOW RET EMDP	ANCI, EX SHORT AMOSS ANCI, S ANCI, S ANCI, S ANCI, EX LO PERMANUTA WHICH ANCI EXPERIMENT A WHICH ANCI EXPERIMENT A LIBERTY (EL-2), '1' EXPERANTS EXTE FTR (EL-2), S EXTE FTR (EL-2), S	j eart obt j early (little in in it is a color in it is a	XXPAND3#:	DEC MON HOW IDIV SUE HOW STORE IEC DEC JUS JHP CHP JE CHP JEE	AX D. DX	; bx - spaces left in tab atop; al - space char to pending at put a blank in output buffer; bump current column hbr; a. done; yet in space; yet in ye
NG28: NG98: SEEDTARN EDTARN IDPARN IDPARN IDPARN DPLPATN	HOW JMP CMP JE STC RET RET HOW CLC RET EEOP C = Eand T, ai -> FROC CMP JME HOW RET EEOP EEOP THE HOW RET EEOP THE	ANCI, EX SHORT ANGS ANCI, 6 ANCI, 6 ANCI, 6 ANCI, 6 ANCI, EX (6 parameters which end first observer part or ENTRE FTM (EI-2), '1' ENTRANNIE STEE FTM (EI-2), 5	j eart obt j early (little in in it is a color in it is a	XXPAND3#:	DEC XON HOV IDIV BUE HOV STORE IEC DEC JNE JNE CMP JNE JNE JNE JNE JNE JNE JNE JNE	AM. DK SK, TAROGL BX BX, DX AL, 288 CURCOL EFRAND28 EFRAND28 EFRAND28 EFRAND3 AL, 80E EFRAND3 AL, 80E EFRAND3 AL, 80E EFRAND3 EFRAND3 AL, 80E EFRAND3 EFRAND3 EFRAND3 EFRAND3 EFRAND3 EFRAND3 EFRAND3 EFRAND3 EFRAND4 EFRAND4 EFRAND4 EFRAND4 EFRAND4	jbs - spaces left in tab atop js - space het to pudding at jpm a black in extent buffer i pemp current column the first pemp current column the space at just a constant pemp current pemp
IG28: IG38: IG ENDPARM Entry IDPARM IDPARM18:	HOW JMP CMP JE STC RET RET HOW CLC RET EEOP C - Eand JE FROC CMP JME HOW RET EMDP	ANCI, EX SHORT AMOSS ANCI, S ANCI, S ANCI, S ANCI, EX LO PERMANUTA WHICH ANCI EXPERIMENT A WHICH ANCI EXPERIMENT A LIBERTY (EL-2), '1' EXPERANTS EXTE FTR (EL-2), S EXTE FTR (EL-2), S	j eart obt j early (little in in it is a color in it is a	XXPAND3#:	DEC XON HOW IDIV SUE HOW STOSE IEC DXC JHS JHP CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE CHP JHE JHE JHE JHE JHE JHE JHE JHE JHE JHE	AX D. DX	j bx * spaces left in tab stop; j al * space that to pridding at j por a Mala in outgot, buffer j d. door pat? j d. door pat? j d. door pat some character j a. par . space column j a. to . cocuriose processing j . cocuriose j c. backspace; j a. b

dd power to your system with 2 FREE **PC Magazine Utilities Disks**

Plus SAVE 62% when you subscribe to PC MAGAZINE

You're Guaranteed Delivery of In-depth product reviews based on

the impartial evaluations of our own PC Magazine Labs.

Power-User Tips and Techniques to help you work faster and smarter. The best, hottest columns anywhere.

Get 2

The PC Magazine 2-Disk Utilities Library: Vol. I and the all new Vol. II features 78

power-user programs that will really rev-up your system! Speed up your keyboard... locate any file in seconds...back up all your data with ease...add a DOS system to a working disk. Not available in any store, these valuable disks are yours FREE with your paid subscription.



That's like getting almost 2 out of 3 issues plus home delivery Free -so you won't miss a single, valuable issue,

The PERFECT CIFT!

Give another power-user-a business associate or friend-a gift subscription to PC Magazine, They'll appreciate getting the late-breaking, in-depth coverage of IBM-standard hardware and software 22 times

High-Impact Graphics



Library, as an extra special gift. And we'll send along a gift card to announce thoughtful

present.

a year-plus the 2-disk Utilities

FREE DISKS/SAVE 62%

ES! I want my Free, 2-Disk Utilities Library and all the power and input PC Magazine provides. Enter my subscription for:

☐ 44 issues (2 years) for \$49.97. SAVE 62%

□ 22 issues (1 year) for \$29.97. SAVE 54%. Savings based on annual newsstand price of \$64.90.

Mr/Mrs/Ms

Company_ Address

City__ ☐ Bill me later.

Please add \$37 per year for postage outside USA, \$25 in Canada, US currency only. Allow up to 60 days for delivery of first issue. Your disks will be shipped upon payment. Basic annual subscription price is \$44.97.

High-Impact

High-Impact

Graphics

High-Impact

Graphics

4N443

Graphics



□ Payment enclosed.

FREE DISKS/SAVE 62%

YES! I want my Free, 2-Disk Utilities Library and all the power and input PC Magazine provides. Enter my subscription for:

44 issues (2 years) for \$49.97. SAVE 62%

22 issues (1 year) for \$29.97. SAVE 54% Savings based on annual newsstand price of \$64.90.

Mr./Mrs./Ms. Company_

Address.

City_ □ Payment enclosed. ☐ Bill me later

Please add \$37 per year for postage outside USA, \$25 in Canada, US currency only. Allow up to 60 days for delivery of first issue. Your disks will be shipped upon payment. Basic annual subscription price is \$44.97.

Zin



GIVE A GIFT/SAVE 62%

Please send a gift subscription and 2-Disk Library to:

Mr./Mrs./Ms. (Please print full name) Company_

Address_ For: 22 issues (one year) for \$29.97. Save 54% 4N401

44 issues (two years) for \$49.97. Save 62% Savings based on annual newsstand price of \$64.90. Please send me the invoice and sign the gift card from:

Mr./Mrs./Ms.__ (Please print full name)

Company.... Address

City_ Please add \$37 per year for postage outside USA, \$25 in Canada, US currency only. Allow up to 60 days for delivery of first issue. The disks will be shipped upon payment. Basic annual subscription price is \$44.97.

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 66 BOULDER, COLORAD

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 51524 Boulder, Colorado 80321-1524

Haldlandladdadladlddaldalddald



NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 51524 Boulder, Colorado 80321-1524

Haddlaradlarddardlardddarddaladaladd



NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 51524 Boulder, Colorado 80321-1524

Haddhaadhadhadhadddaddaddadda

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES



Subscribe and Save

PC Magazine is the most powerful add-on to your IBM-standard system. Subscribe now and save 62% off the newsstand price.

DOUBLE

Subscribe now and you'll add even more to your PC with the 2-Disk PC Magazine Utilities Library—Yours FREE with your paid subscription. You'll get both Vol. I and the all new Vol. II, packed with 78 ultra-powerful utilities to help you increase the speed and flexibility of your DOS system.

Share the power GIVE PC MAGAZINE

Give PC Magazine to a friend or business associate. We'll send an attractive gift card in your name, plus the 2 Free Disks. What a gift!





Get the Most Out of Us!

Join PC MagNet and have instant access to *PC Magazine*'s utilities and editorial staff.

PC MagNet is PC Magazine's on-line information service. which is administered by CompuServe. \$12.50 per hour lets you:

- Download any of PC Magazine's utilities
- · Download files from the Forum data libraries
- · Talk to editors and columnists
- · Tell Dvorak and Zachmann how you really feel
- · Trade tips with Charles Petzold or Ray Duncan
- · Search for back articles on-line
- If you already have a CompuServe account, simply enter GO PCMAGNET at the ! prompt

ONE CALL GETS YOU STARTED! Sign up on-line at no additional charge.

To subscribe, set your modem to: 300 or 1,200 bps. 7 data bits, even parity. 1 stop

bit and full duplex. Call one of the num-
bers listed:
Anaheim, CA(714) 520-9724
Atlanta, GA (404) 266-7014
Baltimore, MD (301) 254-7113
Boston, MA (617) 542-1796
Chicago, IL (312) 693-0330
Cleveland, OH (216) 771-6860
Dallas, TX (214) 953-0212
Detroit, M1(313) 255-9207
Houston, TX (713) 462-0202
Los Angeles, CA(213) 739-8906
Miami El (205) 266-0221

Miami, FL(305) 266-0231

Minneapolis, MN	.(612) 342-2207
New York, NY	.(212) 422-8820
Newark, NJ	.(201) 624-6565
Philadelphia, PA	.(215) 977-9758
Pittsburgh, PA	.(412) 391-7732
San Diego, CA	.(619) 283-6091
San Francisco, CA	.(415) 956-4191
Seattle, WA	.(206) 241-9111
St. Louis, MO	.(314) 241-3102
Washington, DC	

(Note: After you have become a member, you can locate a local telephone access number, or 2,400-bps service, by typing GO PHONES at the ! prompt.)

2. When you receive a Connect or Carrier Detected message, enter Ctri-C. 3. At the HOST NAME prompt, enter CIS.

- 4. At the USER ID prompt, enter 177000, 5000. At the PASSWORD prompt, enter
- PC MAGNET.
- Register your name and enter your VISA, MasterCard, or American Express account number. Your personal User 1D number and Password will be displayed at the end of
- Password will be displayed at the end of the subscription process. Please record them in a secure place. A new password will arrive in the mail within 10 days to confirm your subscrip-

tion. There are no connect charges for PC Mag-Net during the subscription process.



PRODUCTIVITY

UTILITIES

	JWE	EXPAND5#	; get meet cherecter		POP	CX ex	:
	HOV	CURCOL, 1	; init current column		RET		and return to osller
EXPAND48:	STOSS	AL SAN	<pre>j move cheracter to output line ; q. line feed? j s. yee don't count it</pre>	PAGESREAR	EE - Inc	rement line counter an	d test for overflow
	JH	EXPANDSE		SUMPLISE	PROC		
EXPANDS#:	INC	CURCOL EXPANDI®	; bump current column nbr ;loop till input exhausted		THC	LIMECUT. 66	; increment line counter ; q. reached max lines/page?
EXPANDS	POOL				JLE	BUMPLINESS	; e. no continue
	MOA	SI, OPPSET OBUPP CX, DI	<pre>; si -> stert of output buffer ; di -> just past lest cher of ; output</pre>		HOV	HEWPAGE, 1	; else show we'll need a new
	sus	CX, SI	cx = nbr of cherecters in output	SUMPLIME?	RET		j theo return to celler
	POP POP	DE DE	; restore registers	SUMPLISE	ENDP		
	POP	SX AX				out leserjet initieli	eetion string
	RET		;end return to celler	PROLOGUE	PROC		
EXPAND	ENDP				PUSE	CX	; save registers
		le printing s line t of line of cherecters to print			HOV HOV CALL	DX, OFFSET STRINGS CX, STRINGS_LEN WRITE	<pre>; dx -> initialisation string ; ce = length ; print the init line</pre>
Eeits		t of neet line			ww		
ex	- •				HOV	PAGENO, 1 CURCOL, 1 LIMECHT, 1	; setup page number ;and current column number ;end line counter
INTPRT	PROC				HOV CALL	USEDLEN. 6	<pre>jamd current column number jend line counter jebow in left page jolear column position j priot title line</pre>
	JCKE	NEWPAGE, 1	; if mothing to print return		POP	METITLE	
	JHE	MEMPAGE, 1 LIMEPRT10	; q. need s new page? ; s. no contious		POP	CE CE	; restore registers
	CALL	PAGEBREAK	; else do e pagebreek	PROLOGUE	EHOP		;end reture to celler
LIMEPRTIO:		WRITE	; write the line			out leserjet finish u	o atring
	ADD	DE, CE	dx -> stert of next line ce = nbr of cherecters to print	XP1LOGUE	PROC		
LISEPRETO	RET				PUSS	cx	; save registers
LISEPRT	ENDP				PUSS	DX	
		the title line be reedy line line leogth	to print		HOV CALL	DE, OFFSET STRING? CE, STRING? LEN WRITE	; dx -> termination string ; cx = leogth ; print the init line
		e line leogth			VOM	SPOTATE, 0	; show back to initialisation at
COTITLE	PROC PUSS PUSS	AX	; save registers		POP	DX CX	; restore registers
	PUSS	D1			POP	cx .	;and return to celler
	WOW	AX, PAGENO	ax - page oumber	EPILOGUE	EMDP		
	HOV HOV CALL	CX, 4 BL, ', DI, OFFSET TITLE PGE ITOA	<pre>; ax = page oumber ; cx = length of output ; bl = fill char (blenk) ; di -> output ares ; fill io page oumber</pre>	, Enti		string to the printer og to write	
	HOV HOV HOV CALL	DI, OFFSET TITLE POE ITOM DE, OFFSET TITLE CE, TITLE LEM WRITE	; hl = fill char (hlenh); hl = fill char (hlenh); dl -> output ares; fill io page comber; dx -> title; ce = length of title; print title line	, Enti	-> stri - nbr	og to write of cheracters	
	HOV HOV CALL	DI, OFFSET TITLE POE ITOA DE, OFFSET TITLE CE, TITLE LEN WRITE DI	: fill to page oumber	j Enti	-> stri		; seve registers
	HOW HOW CALL POP POP POP RET	DI, OFFSET TITLE FOR ITOM DE, OFFSET TITLE CE, TITLE LEN WRITE	; dr -> output ares ; fill io page oumber ; dx -> title ; ce = length of title ; print title line	j Enti	-> stri - nbr PROC	og to write of cheracters	
	CALL HOV HOV CALL POP POP POP RET	DI, OFFSET TITLE_POE ITOA DE, OFFSET TITLE_ CK, TITLE_LESS WRITE DI SE AX	all -> output area . fill to page comber dx -> title ce -> hength of title print title line restore registers restore to caller	j Enti	y: -> stri - nbr PROC PUSS PUSS PUSS HOW HOW INT	AX BX AM, 485 BX, PHANDLE 21X	; ah = write to file/device func ; bx = printer bendle
PAGEBRE	HOV HOV CALL POP POP POP RET EMDP	DI, OFFSET TITLE_PGE ITCA DI, OFFSET TITLE_ CK, TITLE_LEM WRITE DI SX	all -> output area . fill to page comber dx -> title ce -> hength of title print title line restore registers restore to caller	j Enti	PROC PUSS PUSS PUSS PUSS PUSS PUSS PUSS PUS	og to write of cheracters AX BX AN, 485 BX, PRANDLE 21X	; sh = write to file/device func ; hx = printer bendle ; issue dos cell
PAGEBRE	HOW HOW CALL POP POP POP POP RET EMDP	DI, OFFER TITLE POE IFOA DE, OFFER TITLE CE, TITLE LEN WRITE DI AX AX AX andle page overflow condi	in Output are page comber ; fill to page comber ; fill to page comber ; de title ; fill to fittle ; print title ; print title ; restore registers ; return to caller	j Enti	PROC PUSS PUSS PUSS PUSS PUSS PUSS PUSS PUS	AX BX AM, 485 BX, PHANDLE 21X	; ah = write to file/device func ; bx = printer bendle ; issue dos cell ; restore registers
PAGEBRE	HOW HOW CALL POP POP POP RET EMBP AK - Gai	DI, OFFER TITLE FOE IFOA DE, OFFEE TITLE EXITE DI SE AM Male page overflow condi	all -> output area . fill to page comber dx -> title ce -> hength of title print title line restore registers restore to caller	J Ents J ds J cs WAITE	y: -> stri ->	AX BX AM, 485 BX, PHANDLE 21X	; ab = write to file/device func ; bx = printer hendle ; lasee dos cell ; restore registers ; ;and return to celler
PAGEBRE	HOV HOV CALL POP POP RET EMOP AK - Gai PROC PUES PUES PUES PUES TEST	DI. OFFER TITLE_DELITOR DI. OFFER TITLE_CE, TITLE_LES WRITE_LES MRITE_LES AR AR AR AR AR AR AR AR AR A	i. fill to pass comber id. fill to pass comber capitars in the fill to pass comber id. fill to pass comber id. fill to pass capitars id. fill to pass capita	; Enti ; do ; ex ; ex ; ex ; ex ; ex ; ex ; ex ; ex	y: -> stri -> nbr FROC PUSS PUSS PUSS HOW HOW HOW THT FOP FOP RET EMDP - Conve.	og to write of cheracters AX AX AM, 488 BX, PRANOLE 21x AX AX	; ah = write to file/device fund h h = printer hendle ; isee doe ; isee doe; i :-and return to celler and return to celler
PAGEBRE	CALL HOW HOW CALL POP POP AND POP AND POP AND POP EMET EMED AK - Gai PROC PUSS PUSS PUSS PUSS TEST JS	DI OPPRET TITLE_DOE DITON DE, OPPRET TITLE CEL TITLE_LESS DE DE AX AX AX PAGENCE, 1 PAGENCE, 1 PAGENCE, 1 PAGENCE, 1	in till to personner de till ce - length of title person till prattice line prattice prettire	J Ents J ds J cs WAITE	y: -> stri -> nbr FROC PUSS PUSS PUSS NOV NOV INT POP POP RET EMDP - Conve	on to write of cheracters AX AX, 488 BX, PRANDLE 21X AX TC command line arguments	; ah = write to file/dewice fun ; hs = printer bendie ; isses doe call ; restors registers ;and return to celler sta to uppercese ; seve caller regs
PAGEBRE	CALL HOW HOW CALL POP POP POP RET EMOP AK - Gai PROC PUSE PUSE TEST JE HOW HOW CALL	DI OPPRET TITLE_DOE TOWN DI, OPPRET TITLE_ CRETTITLE_LESS TOWN DI TOWN	i. fill to pass comber id. fill to pass comber capitars in the fill to pass comber id. fill to pass comber id. fill to pass capitars id. fill to pass capita	J Enti J do J c) WRITE	y: -> stri -> nbr PROC PUSS PUSS NOV HOV INT POP POP RKT ENDP - Conve. PROC PUSS PUSS NOV CLD	on to write AX AX AX AX AX AX AR AFR BR THEADOLE SE AX AX AX AX AX AX AX AX AX A	; sh = write to file/device fun ; h = printer bondi ; teme doc call ; restors registers ;and return to celler te to upperceas ; see celler regs ; si > celler regs ; si > celler regs ; si > celler regs ; si > celler regs ; see for di ; sees for di ; sees receding
PAGEBRE	CALL HOW HOW CALL POP POP RET EMOP AK - Gai PROC PUSS PUSS PUSS TEST JE HOW HOW HOW HOW HOW HOW HOW HOW	DI. OFFET TITLE_DES TYPES DI. OFFET TITLE_ DI. OFFET TITLE_ DI. OFFET TITLE_ DI. OFFET STRINGI	is this per owner for a country fo	J Ents J ds J cs WAITE	y: -> stri -> nbr FROC PUSS PUSS HOV HOV INT SOP POP POP POP PROC PROC PUSS PUSS PUSS PUSS PUSS PUSS PUSS PUS	og to write Ad Ad Ad Ad Ad Ad Ad Ad Ad A	; ab = write to file/device fun ; he spitche bondle ; he spitche bondle ; new observer registers ;mid return to celler ;mid return to celler ste to uppercess ; sew celler rege ; si -> start of para serse ; searse seconding ; al - chart
PAGEBRE	CALL HOW HOW CALL POP POP POP POP RET EMOP AK - Gai FROC PUSS PUSS PUSS PUSS PUSS VICE TEST JS HOW CALL NOW HOW HOW HOW	DI. OFFER TITLE_CO. TITLE_CO. DI. OFFER TITLEOU.	in till it per owner for a booth of title for a booth of order for a booth of title	J Enti J do J c) WRITE	y: -> stri -> nbr FROC PUSS PUSS HOV HOV INT FOP FOP FOP FOR TEXT ENDP - Conve PUSS FUSS HOV HOV LODES CHP JE LODES	og to write of cheracters AZ	; ab = write to file/device func ; he a printer bondle ; restore register ; -and return to celler ; -and return to celler ste to uppercess ; i -> start of para ures ; i -> start of para ures ; exerce seconding ; al - char
PAGEBRE	CALL HOW HOW CALL POP POP POP POP RET EMOP AK - Gai FROC PUSS PUSS PUSS TEST JS HOW HOW CALL NOW HOW HOW CALL	DI. OFFET TITLE_DES TYPES DI. OFFET TITLE_ DI. OFFET TITLE_ DI. OFFET TITLE_ DI. OFFET STRINGI	i. It is per owner if a bits for bits for bits preserve registers preserve regist	J Enti J do J c) WRITE	y: -> stri -> nbr FROC PUSS PUSS HOV HOV INT FOP FOP FOP FOR TEXT ENDP - Conve PUSS FUSS HOV HOV LODES CHP JE LODES	on to write AX AX AX AX AX AX AX AX AX A	; ab = write to file/device func ; he a printer bondle ; restore register ; -and return to celler ; -and return to celler ste to uppercess ; i -> start of para ures ; i -> start of para ures ; exerce seconding ; al - char
PAGEBRE	CALL HOW HOW CALL POP POP POP POP RET EMOP AK - Gai FROC PUSS PUSS PUSS PUSS PUSS VICE TEST JS HOW CALL NOW HOW HOW HOW	DI. OPERT TITLE_NO. THE AMERICAN THE AMERICAN DISTRIBUTION OF THE AMERICAN	in till it per owner for a booth of title for a booth of order for a booth of title	J Enti J do J c) WRITE	y: -> stri -> nbr FROC PUSS PUSS HOV HOV INT SOP POP POP POP PROC PROC PUSS PUSS PUSS PUSS PUSS PUSS PUSS PUS	og to write of cheracters AZ	; ab = write to file/device func ; he a printer bondle ; restore register ; -and return to celler ; -and return to celler ste to uppercess ; i -> start of para ures ; i -> start of para ures ; exerce seconding ; al - char
PAGEBRE	CALL HOW HOW CALL POP POP POP POP POP POP POP TENT EMDP TROC PUSS PUSS PUSS TEST JS HOW	DI. OPER TITUS_DOE TIMO THE TITUS_DOE TO THE TIMO THE TIM	i. It is per owner if a bits for bits for bits preserve registers preserve regist	MRITE WRITE UPCAME:	y: -> stri -> shri ->	og to write of theretes AX	; sh = write to file/device func ; lesses des cell ; lesses des cell ; lesses des cell ; rewtors explaints ; rewtor suppresses ; rew celler raps ; ri > rettor form serve ; ri > rewtor form serve ;
PAGEBREAK AGEBREAK	CALL DEC JIE CALL DEC MONTH DEC MO	DI. OPERT TITLE_NO. THE OPERATE TITLE_NO.	is till in personner if a bittle for a bretch of tile for a bre	y Entiple of the control of the cont	Y: -> stri ->	om to write of the return of t	, sh = write to file/device func ; issue dos cull ; issue dos cull ; cautor supplicates ;and return to celler to to upperceas ;and return to celler ;and return to celler ;and return to celler ;and return to celler ;and recently ;and return to celler ;and continues ;and continues ;and continues ;and continues ;and continues ;and continues
PAGEBREAK AGEBREAK PAGEBREAK PAGEBREAK	CALL POP PUSS PUSS PUSS PUSS PUSS PUSS PUSS PUS	THE OWNER THING ON THE OWNER THE OWN	de 3-title spee conner je a title spee conner je a teeth of title je attent to caller the conner je attent to caller je attent to caller je attent to caller je attent to caller je attent je at	WRITE WRITE WRITE UPCAME U	y -> atri ->	og to writer AM AM AM AM AM AM AM AM AM A	; sh = write to file/device fund ; lesses don cell ; lesses don cell ; lesses supplier ; reators supplier ;
PAGEBREAK AGEBREAK AGEBREAK AGEBREAK	CALL CALL FOP FOP FOP FOP RET FROC FUSS FUSS FUSS FUSS FUSS CALL MOV HOV CALL JE MOV HOV CALL JE MOV CALL L MOV CALL L MOV CALL CALL	DI OPERT TITLE_NOE DISCOMMENT D	i. It is per owner if a - itis price relative price relativ	UPCAMEIS: UPCAMEIS: UPCAMEIS: UPCAMESS: UPCAMESS: UPCAME	y - abri - abr	og to writer AM AM AM AM AM AM AM AM AM A	; sh = write to file/device function is lessed don cells in several se
PAGEBREAK AGEBREAK AGEBREAK AGEBREAK	CALL NOV	DI. OFFER TITLE_OR THE PROPERTY	in till i per omner de Stills print till i per omner print till i per print till	UPCAMEIS: UPCAMEIS: UPCAMEIS: UPCAMEIS: UPCAMEIS: UPCAMEIS: UPCAMEIS:	yi - abri	og to write of theretes AX	; sh = write to file/device function is lessed don cells in several se
PAGEBREAK AGEBREAK PAGEBREAK PAGEBREAK	CALL POP	DI. OPERS TITLE_NO. DI. OPERS TITLE_NO. DI. OPERS STRINGS DI. OPERS ST	in till it per omner de Stitle print vitte line print vi	WRITE WRITE WRITE UPCAMEIS: U	yi - abri - bri - conve - conv	og to writer AM AM AM AM AM AM AM AM AM A	, sh = write to file/device func ; issues don crilitar ; castors registers ;and return to celler ;and return films; ; is the files ; return red films; ; is the files ; red films; ; red films; ; red continues ; return red continues ; return red continues ; and return to celler
PAGEBREAK PAGEBREAK10:	CALL NOV	DI. OFFER TITLE_OR THE PROPERTY	in till i per omner de Stills print till i per omner print till i per print till	WRITE WRITE WRITE UPCAMEIS: U	yi - abri - bri - conve - conv	og to writer AM AM AM AM AM AM AM AM AM A	, sh = write to file/device func ; seems don coll ; seems don coll ; seems don coll ; restors registers ;and return to celler ;and return to celler ;and return to celler ;and return to celler ;and return do files ;and files ; restors recording ; and return to celler

To Choose The Right Computer, You Have To Look A Little Deeper.



Additional parallel/serial ports can be located in the chassis

Our special PC1386 toolkit includes a perfectly-sized screwdriver allowing easy opening and closing of the case without damaging the screws.

Power supply is UL approved



features a replaceable 32-bit CPU card, which gives you complete upgrade capabilities

Speaker volume control is from mounted, and user adjustable, allow ing you to quickly adapt your AMAX PC 386 to any working environment.

The convenient front-mounted on-off switch provides easy access, which means you can tuck the PC into a corner of your desktop and save space.

going to like what you see.

The five standard half-height disk drive slots allow for additional disk drives, tupe backups, and hard disks as your needs grow.

These days it seems a lot of PC makers would rather show you a beautiful outside than reveal what's behind it. But at AMAX, we're so proud of our line of high performance, IBM*compatible PCs that we want the world to see exactly what makes them the best in the business, inside and out.

Of course, building a truly dependable computer requires more than quality materials and quality fabrication. It also takes a commitment to quality control, and that's where we're

All run at O-Whit States



at our best. Before an AMAX PC leaves the plant, all systems and components undergo rigorous testing and evaluation including an extended "burn-in" period at temperatures ranging from 110° to 130°F. And our commitment continues after the sale, with long-term technical phone support, quick turnaround service and a 12-month limited warranty.

Scratch the surface a little deeper, and you'll find that AMAX PCs run all PC and MS-DOS compatible software with ease. And that our architecture meets or exceeds industry standards for PC compatibles. And speaking of scratches, we certainly don't neglect our sleek exteriors, either. If there's so much as a single blemish on an AMAX chassis, it's immediately rejected.

Finally, you won't have to dig a little deeper to pay for it all, because our price/performance ratio makes AMAX an eminently affordable buy. For a dealer near you, call us today at 800-888-2629, ext. 386. Once you look into AMAX, we think you're

We're Building A Computer You Can Live With.

AMAX Engineering Corp., 47315 Mission Falls Court, Fremont, CA 94539 IBM is a registered trademark of International Business Machines Corporation.

Make your point without a trace of doubt.

With the new HIPAD PLUS series.



*U.S. suggested retail prices. HIPAD Plus and Houston Instrument are trademarks of AMETEK. Inc.

If you've ever used a digitizer, you probably were surprised that it didn't do what you thought it would. You assumed that whatever you picked or moved or drew on the tablet would be accurately displayed on the screen and precisely reflected on output. In spite of its straight-forward appearance, it didn't take you long to learn that all digitizers were not created equal, or accurate, or even easy to use.

Today there's a new line of digitizers that can meet your expectations. It's the new HIPAD Plus" series. With sizes ranging from a compact 12"×12" to a drafting-size 44"×60," each model reflects HI's tradition of price/performance excellence.

Compare, for example, the sleek 9012 and 9018 models (shown below) which contain HI's exclusive tilt-correction feature. This unique feature lets you use the stylus like a pencil—no need to hold it in an awkward perpendicular position. HI's tablet captures only the points touched by the tip of the stylus, so you can make menu selections, create freehand drawings, move the screen cursor, or edit pixel-by-pixel—without a trace of doubt.

If you prefer a handheld cursor, you'll find HI's new four-button cursor has the same pin-point precision. (You'll also like the way it feels in your hand.)

The HIPAD Plus digitizers are compatible with both your CAD and graphics systems. Each model processes coordinates rapidly (up to 200 pairs per second) and has a resolution of up to 2,540 lines per inch. This all adds up to high performance and accuracy—and it means you won't be replacing your tablet to meet the high-resolution demands of the future.

Änd, with prices like \$495* for the 12"×12" tablet and \$795* for the 12" ×18" tablet, HIPAD Plus is affordable. Make your point without a trace of doubt. For details, call 1-800-444-3425 or 512-835-0900.

HOUSTON INSTRUMENT

8500 Cameron Road, Austin, TX 78753

CIRCLE 117 ON READER SERVICE CARD

■ UTILITIES

	EOR	AX, AX	; ax = accumulator = 9	1	EOR	DE, DE	; dx:ax = velue to divide
				1	IDIV	EX	; ax - dividend, dx - remainder
T0119:	CKP	RYTE PTR [E1], '0'	; q. below aecii 67	1	OR	DL, 36H	; dl = ASCII number
	JE	ATOI98	1 a. yea exit		YOM	(DI), DL	; etore charecter in buffer
				1	DEC	DI	; di -> next output oher location
	CKP	EXTE PTR (EI), '6'	; q. above escii 97				
	JA	ATOI90	1 a. yea., exit		DEC	CE	; q. any more room in buffer?
				1	JWE	ITOA16	1 0. yea ., continue loop
	EOR	AN, AN	; reast ah				
	YOM	BL. 16	; bl = multiply velue	1	POP	EE	; restore register
	MUL	ML.	1 multiply by 10		JICP	1TOASS	1 and exit through common code
	MOV	BL. (GI)	t bl = value				
	AND	DL. OFH	1 upper bits off	ITOA2#1	POP	AX	: el = fill character
	ADD	AL. EL	: add to bl				
				ITOA3#:	ETOSB		: etore fill character
	INC	RI	1 ai -> next cher				
	JHP	ATOI 10	t tranlate it	1	DEC	CE	; q. any more room in buffer?
					JNE	170A36	1 e. yee ., continue loop
TOI98:	957		: return to celler				,
				ITOA90:	POPF		: restore fless
1074	PERF				POP	DT	1 and registers
					POP	DE	
					POP	DE	
ITOA -	Integer	to ASCII characters				CX	
ITOA - Entr	Integer	to ASCII characters			107	CE EX	
ITOA - Entr	Integer y: - valu	to ASCII characters e to convert			POP	CI EI	
ITOA - Entr AX	Integer y: - valu	to ASCII characters e to convert character			POP POP	CI EI	and return
ITOA - Entr Ax bl	Integer y: - valu - fill	to ASCII characters e to convert character of characters		1704	POP POP	CI EI	; ; ;and return
ITOA - Entr ax bl cx	Integer y: - valu - fill - nbr -> atar	to ASCII characters e to convert character of charactera t of alphe ares		1704	POP POP POP RET	CI EI	and return
Entr Entr Ax bl cx di	integer y u u fill nbr -> atar	to ASCII characters e to convert character of charactera t of alphe ares		1	POP POP POP RET END?	CI EI	; and return
Entr Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar	to ASCII characters e to convert character of charactera t of alphe ares		Uninit	POP POP POP RET END?	CX EX AX	end return
ITOA - Entr Ax bl cx di	Integer y = valu = fill = nbr -> atar FROC	to ASCII characters e to convert character of characters t of alphe ares		Vainit	POP POP POP RET END?	CX EX AX	, start of unitial land data
Entr Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar FROC PUEE	to ASCII characters e to convert character of charactera t of alphe ares		Uninit	POP POP POP RET END7 tialized	CX EX AX date arese	, start of unitial land data
ITOA - Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar FROC PUEE PUEE	to ASCII characters e to convert character of charactera t of alphs ares AX EE) Uninit	POP POP POP RET ENDF tialized	CT EX AX date arese \$ MORD PTR UDATA	; etert of unitialized deta
ITOA - Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar FROC PUEE PUEE PUEE PUEE	te ASCII characters a to convert character of charactera t of alphe ares AX EE		Uninit UDATA PAGENO	POP POP POP RET EMDF tialized	CT EX AX date arese \$ WORD PTR UDATA WORD PTR FACENCY 3	; etert of unitialized deta ; current page number ; current poluma
Entr Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar FROC PUEE PUEE PUEE PUEE FUEE FUEE	to ASCII characters e to convert character of characters t of alphe ares AX EE CE DE		UDATA PAGENO CURCOL	POP POP POP RET EMDF tialized EQU EQU EQU EQU EQU	CI EX AX date armee word PTR UDATA word PTR FACENCH-1 word PTR CURCOL-2	; etert of unitialized deta ; current page number ; line constium;
Entr Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar FROC PUEE PUEE PUEE PUEE PUEE PUEE PUEE PU	te ASCII characters a to convert character of charactera t of alphe ares AX EE		UDATA PAGENO CURCOL LIMECHT	POP POP POP RET EMD7 tialized EQU EQU EQU EQU EQU EQU EQU	date arese s are pre upara wood pre upara	; etert of unitialized deta ; current page number ; ourrent column ; line count ; current diek
ITOA - Entr ax bl cx	Integer y: - valu - fill - nbr -> atar FROC PUEE PUEE PUEE FUEE FUEE FUEE FUEE FUEE	to ASCII characters e to convert character of characters t of alphe ares AX EE CE DE	; asve registors	UDATA PAGENO CURCOL LINECHT	POP POP POP RET END? tialized EQU EQU EQU EQU EQU EQU EQU EQU EQU EQU	CX EX AX date arese from PTR UDATA MORD PTR CURCUL-2 EXTE PTR EXECUT-2 EXTE PTR EXECUT-2 EXTE PTR EXECUT-2	; etert of unitialized deta ; current page number ; ourrent column ; line count ; tree out
Entr Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar FROC PUEE PUEE PUEE PUEE PUEE PUEE PUEE PU	to ASCII characters e to convert character of characters t of alphe ares AX EE CE DE		UDATA FAGING CURCOL LINECHT EDEV EDIE FILEMANE	POP POP POP POP RET END? Lialized EQU EQU EQU EQU EQU EQU EQU EQU EQU EQU	CT ST AX	stort of unitialized deta gourrent page number ourrent column ; line count ; current diet ; current diet ; [liename sercifed as ANG]
ITOA - Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar FROC PUEE PUEE PUEE PUEE PUEE PUEE PUEE PU	to ARCII characters e to convert character t of alphs ares AX EE CE DE 01	; asve registers ;sed est direction fleg	UDATA PAGENO CURCOL LINECKT EDEV EDIE FILENAME LASTEUFF	POP POP POP RET END? Tialixed EQU EQU EQU EQU EQU EQU EQU EQU EQU EQU	CE EL AX date areee date recept upara MORD PTR TAZERO-3 MORD PTR TAZERO-2 ETTE PTR LUNCUTY-2 ETTE PTR LUNCUTY-2 ETTE PTR LUNCUTY-2 ETTE PTR EDIV-1	; etert of unitialized deta ; current page number ; libe count ; libe count ; vurrent directory ; lilename specifed as AMG1 ; lilename specifed as AMG1
ITOA - Entr Ax bl cx di	Integer y: - valu - fill - nbr -> atar FROC PUEE PUEE PUEE PUEE PUEE PUEE PUEE PU	to ASCII characters e to convert character of character t of alphs ares AX EE CE DE OI OI, CX	; anve regiators ;and est direction fleq ; di -> ist char sest work eres	Uninity UDATA FAGING CURCOL LINECHT EDEV EDIV FILEMANE LASTRUFF FRANCE	POP POP POP RET ENDF Lialized EQU EQU EQU EQU EQU EQU EQU EQU EQU EQU	GE EX AX date areae \$ MOND PTH UDATA *** OWNER	; etert of unitialized deta courrent column ; ourrent column ; line count ; line count ; urrent directory ; filename specifed as ARGI ; language file indicator
Entr Entr Ax bl cx di	Integer y = valu = fill = nbr -> atar FROC PUEE PUEE PUEE PUEE PUEE PUEE PUEE PU	to ASCII characters e to convert character for character t of alpha area AX EE EE EE DE DE OI, CX OII	; anve registers ;and est direction flee ; di -> lat cher pest work erea	Uninity UDATA PAGENO CURCOL LINECHT EDEV EDIE FILENAME LASTEUFF FRANCLE EUFFER	POP POP POP RET END? tialized EQU EQU EQU EQU EQU EQU EQU EQU EQU EQU	CE EX AX	stert of unitialized deta current page number ourrent column ourrent diak vurrent directory filename specifed aa AMGI laat buffer indicator light buffer indicator
Entr Entr Ax bl cx di	Integer y = valu = fill = nbr = nbr = nbr FROC PUEE PUEE PUEE PUEE FUEE FUEE FUEE FUE	to MCII characters e to convert character character t of alphe ares AX EE CC DE DI DI, CX DI EE	; .end est direction fleq ;end est direction fleq ; di -> let char peut work erea ; di -> let char in work eree	Uninit UDATA FAGENO CURCOL LIMECHT EDEV EDIE FILEMANE LASTEUFF FRANDLE EUFFEE EUFFEE EUFFEE	POP	CE EX AX date arese \$ MONE PTH UDATA MONE PTH TACENCH; MONE PTH TACENCH; MONE PTH CONCOLL; ETTE PTH EDIX+1; ETTE PTH EDIX+1; MONE PTH LEMEME-1;	; etert of unitialized deta current page number ; line count ; burcent directory ; burcent directory ; burcent directory ; last buffer indicator ; lapput file handle ; file buffer (see
ITOA - Entr Ax bl cx di	Integer y = valu = fill = nbr -> atar FROC PUEE PUEE PUEE PUEE PUEE PUEE PUEE PU	to ASCII characters e to convert character for character t of alpha area AX EE EE EE DE DE OI, CX OII	; anve registers ;and est direction flee ; di -> lat cher pest work erea	UDATA DATA DATA DATA DATA DEV CURCOL LIMECHT EDEV EDIE FILERAME LASTRUFF FRANCLE EUTTEE UNEGLEM UNEGLEM	POP POP POP RET ENDP Lialized EQU EQU EQU EQU EQU EQU EQU EQU EQU EQU	CR SH ARE STATES OF THE STATES	; etert of unitialized deta ourrent column ; line count ; line count ; burrent directory ; filename specifed as ANO1 ; input file handle ; file buffer ; length of buffer ; length of buffer
TOA - Entr axe bl cr di	Integer y i = valu i = fill i = nbr i => atar FROC PUEE PUEE PUEE PUEE FUEE FUEE FUEE FUE	to McCII characters a to convert character of characters of characters t of alphe area area c c c c c c c c c c c c c c c c c c c	; .end ext direction fleq ; .end ext direction fleq ; di -> lst cher past work scea ; ever fill character; area ; bar divised	Uninit UDATA FAGENO CURCOL LIMECHT EDEV EDIE FILEMANE LASTEUFF FRANDLE EUFFEE EUFFEE EUFFEE	POP	CE EX AX date arese \$ MONE PTH UDATA MONE PTH TACENCH; MONE PTH TACENCH; MONE PTH CONCOLL; ETTE PTH EDIX+1; ETTE PTH EDIX+1; MONE PTH LEMEME-1;	j etert of unitialized deta ourrant page number line count unit count last buffer indicator ipput file handle file buffer
TOA - Entr axe bl cr di	Integer y: valu valu fill nbr nbr roc PUEE PUEE PUEE PUEE PUEE FUEE FUEE FUE	to McCII characters a to convert character of of characters of of characters to of alphe area area can be converted by the can be called a can	; new registers ; .end est direction fleg ;di.> lat char pest work sees di.> lat char je work sees ; .en clil bloometer ; .en clil bloometer ; .en clil bloometer ; .en clil bloometer	Uninit UDATA	POP POP POP POP RET END7 Lialized EQU EQU EQU EQU EQU EQU EQU EQU EQU EQU	CR SH ARE STATES OF THE STATES	etert of unitialised deta current page number line country line country filmens specified as ANDI filmens specified as ANDI ioput file handle file buffer file buffer used length in e logical line output buffer - must be last;
ITOA - Entr Ax bl cx di	Integer y i = valu i = fill i = nbr i => atar FROC PUEE PUEE PUEE PUEE FUEE FUEE FUEE FUE	to McCII characters a to convert character of characters of characters t of alphe area area c c c c c c c c c c c c c c c c c c c	; .end ext direction fleq ; .end ext direction fleq ; di -> lst cher past work scea ; ever fill character; area ; bar divised	UDATA DATA DATA DATA DATA DEV CURCOL LIMECHT EDEV EDIE FILERAME LASTRUFF FRANCLE EUTTEE UNEGLEM UNEGLEM	POP POP POP RET ENDP Lialized EQU EQU EQU EQU EQU EQU EQU EQU EQU EQU	CR SH ARE STATES OF THE STATES	; etert of unitialized deta ourrent column ; line count ; line count ; burrent directory ; filename specifed as ANO1 ; input file handle ; file buffer ; length of buffer ; length of buffer

			 (LASERLST.ASM en
MM - MAJO TOOMAN TO CHAPT LABELED	EM - LAMBOURT COMP AN \$1 LEW * 1 VAL	1 1 1 1 1 1 1 1 1 1	

Heaven forbid we should offend anyone. But it's a fact of life that you can't save every magazine you read.

Here's another fact. As soon as you throw something away, you discover you need it. In which case, get on your modem tions going back to early 1987. You can zero in on any one of thousands of reviews, articles, case histories or

Throw this m

and dial up Computer

Database Plus

Computer Database Plus lets you access every issue of 125 major computer publicaabstracts. With as little to go on as a key word.

Almost before you can say "laser printer," for example, you've tracked down that crucial product review.

Even if the article you want has just hit the stands, you're in luck. *Computer Database Plus* is updated with almost 5,000 abstracts and articles each month from current publications.

And with Computer
Database Plus, you don't
throw money away. You can
print out the abstract or full
article for as little as \$3.50. Or
you can jot down the article
title, issue and date, if that's
all you need, for even less.
So even if you can't save

every computer magazine

supplier of information databases.

Start using *Computer*Database Plus right away on
CompuServe or PC MagNet.

agazine away.

you read, you're saved.

Just remember Computer

Database Plus

From Information Access
Company, the leading

Just type GO COMPDB.

Or call 1-800-441-1165 for more information.

Introducing
COMPUTER
DATABASE PLUS

The on-line library of computer publications.

Computer Detailater Plus is a trademain of Information Access Company

UTILITIES

is used to print listings of program files, "readme" files, and the like, so the lack of word-wrap provisions is immaterial. LA-SERLST won't choke on lines longer than 81 characters; they just won't look as nice as you'd like.

Third, the tab characters in the text file will be replaced with spaces in the printout. If a tab is followed by one or more backspaces, each backspace will back up over only one of the tab-created spaces. Since LASERLST honors carriage-return and backspace codes individually, they can be used to overprint characters for such effects as underlining and strikeover.

HOW LASERLST WORKS The LASERLST program has three sections: command-line parsing, input-file I/O, and
printer-state management. The code
shown in LASERLST.ASM is heavily
commented, so look there for details, but
I'll touch on some of the highlights.

On entry, LASERLST checks the command-line parameters and simply aborts if they're bad. Next, it determines if the output file can be opened and whether any of the specified input files exist. If they do,

■ LASERLST has three sections: command-line parsing, input-file I/O, and printer-state management.

each file is opened and read and its contents are passed to the print routine. When the end of the current file is read, the output file is not closed, though the print routine is informed that the end of file was encountered. That way, the print routine can return to its initial state, ready to print page 1 of the next file. When the last file is finished, control is returned to DOS.

Before command-line parsing starts, the current drive and directory are saved so they can be restored before returning to DOS. Next, the first argument is searched to see if a drive or path was specified. If so, the current drive and directory are changed to it. The reason for the change is that the DOS FIND FIRST and FIND NEXT MATCHING FILE calls return only the name of the file found. In order to open the named file it is necessary either to note the directory passed on the command line and append each filename found to it or, more simply, to be in that directory, where you can open the file just by passing the filename.

Determining whether a drive was specified on the command line is as easy as



They can't mess with your data.

Plus Passport. The highest performance removable hard disk. With Passport," you can have all the performance of the best fixed hard disks: 20 or 40 MB of capacity. And an effective access time of 28 ms. Passport is

even two to three times more reliable. But you can take the entire hard disk out of your PC in seconds. And lock it up in a safe place.

How does Passport compare to cartridgebased removables? It holds twice as much data. checking to see if the second character is a colon (:). Determining the path specified is a little more difficult, since the path runs from the character after the drive (if specified) through the last backslash (\) found. A REPNE SCASB instruction is used, starting from the end of the parameter, with the CPU's direction flag off. This causes a right-to-left search. If the final backslash is found, it is replaced by an ASCII zero to be passed to the DOS CHANGE CURRENT DIRECTORY call

An interesting point to note in passing is that DOS will not open a file whose name ends in a colon, as would a user-supplied outfile of LPT2: LASERLST fixes this by noting the colon at the end of the file specification and changing it to a null.

The input file processing is rather unremarkable except for one minor point. The DOS FIND FIRST function, which finds the first matching file to print, is used at

initialization time and serves the dual purpose of initializing the FIND FIRST/FIND NEXT process and of determining if there are any files to print. The FIND NEXT is then performed directly after the close of

■ The real meat of LASERLST is in its print routine, which maintains the current state of the printer.

each file, determining whether there are any more files to process.

The real meat of LASERLST is in its print routine. This routine maintains the current state of the printer, which includes the "printhead" position, the line currently being printed, and which side of the page is being composed. As each buffer of the file is read, it is passed to the PRINT routine. If it's the first buffer of a file, the initialization code in the routine PRO-LOGUE is executed, which writes an initialization string to the output file and initializes the print-routine state.

Any tabs in the buffer are then expanded into an appropriate number of spaces. Oddly enough, this is what accounts for the program's maximum memory requirement. Since LASERLST completely expands each 2K buffer read and the maximum tab width is 16, if someone were to pass LASERLST 2K worth of tab characters with /T16 specified, it would require 32K to expand it to blank spaces. The program itself requires about 4K between its .COM size and the uninitialized data area. Added to the 32K for an all-tabs buffer,



If your data isn't there.

It's much faster. It doesn't wear out. And it doesn't need head cleaning or regular preventive maintenance. So you get all the security of a removable. And none of the drawbacks. If you'd like to know more, we'll send you a free applications guide, complete with technical details. And show you the only practical way to keep private data private. Just call us at 1-800-624-5545."

oice Mail Card

INTRODUCING THE NEW VOICE MAIL CARD IT TURNS ANY PC INTO A POWERFUL VOICE MAIL SYSTEM

IT'S A FULL FUNCTION VOICE MAIL SYSTEM

The Voice Mail Card gives you individual private voice mail boxes, each coded by a password. It takes messages and forwards messages to other phones, just like a private receptionist. And of course you can retrieve messages remotely from any touch-tone phone

IT RECORDS DIGITALLY

like the most expensive voice mail systems. The Voice Mail Card records right on your hard disk You'll be amazed at the clarity of reproduction

5.25" 360 KB Drive for PCs/XTs....

5.25" External Drive for Toshiba lap top

5.25" 360 KB External Drive for PS/2..... \$179

3.5" 720 KB Drive with 5%" mounting kit

3 5" 880 KB External Oriva for Amiga

3.5" 800 KB External Orive for Apple Ilos

35" 1.44 MB Drive with 5%" mounting kit

5.25" 1.2 MR Drive for ATs.

5.25" Drive for Appla IIc/IIgs

5 25" Drive for PC Transporter

A WHOLE LOT OF APPLICATION IS YOURS Tailor it to your own specific needs. Ideal for mail order, telemarketing, university voice mail system, and a lot, lot more!

IT REALLY IS AFFORDABLE

Lots of application for less money. It has a simple price tag, starting from \$150. Get the right one to work for you now! All you need is an MS-DOS PC, a hard disk and a lot of incoming calls. We also carry top brand soft-



\$ 65 \$ 75

\$219

\$ 79 \$ 86

\$169

\$200

ware for Integrated, Spreadsheet, Graphics, Database, and Accounting applications at a low, low price. CALL US TODAY TO FIND

OUT MORE!

TOLL FREE ORDER LINES Inside NY 1-800-553-6224 Outside NY 1-800-433-6224

For more information call KINSON PRODUCTS CORP.

482-484 Sunrise Highway Rockville Centre, NY 11570 Tel. (516) 763-0906

\$189 CIRCLE 193 ON READER SERVICE CARD

Products. ALL PRODUCTS, LOWEST PRICES, EXPERT ADVICE WITHOUGHORY OFFERS WITHOUGH OF BROWN OFFERS WITHOUGH OF BROWN OFFERS WITHOUGH OFFERS WI SELECT CD-ROM SOFTWARE Central Engal Dictors of the Constitution of t NEW \$945 NEW TOLL FREE ORDER LINE . 800-MEGABYTe (634-2298) CD-ROM and WORM DRIVES Hitachi 15035 External CD-RDM Drive with Audio . Historii 19035 Externa (2)-HIDM Drive With Audio 15035 With Digital Audio Dutput and CD-Capture Historii 35005 Internal 1/2 Height CD-RDM Drive wAudio NEC Intersect CD-RDM Drives for the Apple/Mac Maxtor 800 MB WORM Drive \$1229 CALL CALL CD-PBy (898) Poo-to utility that permits user to play all audic CDs on Hischill and compatible drives. Outsout to headednores or ancillation. CD-AudioFile. (Shell) Automobiosity creates distained records of all your audio CDs. Allows you to store a preferred by accurate for each data. Automobio recognition of CDs. Dreaded blace compatible records. Consulting Services Now Available Compact Disk Products 223 E. 85th St. New York, NY 10028 1el 212-737-8400 Fax 212-439-8709 Compuserve 75530,214 INTERNATIONAL ORDERS A SPECIALTY

UTILITIES

this yields a 36K memory requirement. Figure 2 shows the memory layout at runtime

After the tab expansion, each character is examined to see whether it will have a special impact on the printout. The special characters noted are carriage return, line feed, form feed, backspace, and character 82, on any given line. In explaining how LASERLST handles these characters, I'll use the conventional terms "printhead" and "paper movement." While there is no actual printhead in a laser printer, it's still the best term to use in describing how the program regards the position in the current line. Similarly, paper movement accurately describes how the LASERLST program regards moving "down" each page as it is printed.

A carriage return causes the printhead to move to the first character on the current line. No paper movement is caused by a carriage return.

The line feed causes the paper to move up a line, but does not cause the printhead to move. Thus, for example, if the printhead is at column 10 on line 3 when a line feed is encountered, the next character will be printed in column 10 of line 4. This is important because it also means that only 71 characters will be available on line 4 before the line wraps.

A form-feed character causes the print-



Figure 2: With this memory layout, only the memory that starts at the first byte of the JMP MAIN (100h) instruction and the end of the code area must be saved in the LASER ST.COM file.

■ PC MAGAZINE'S FREE UTILITY: A SUMMARY

LASERLST BY MODEM

he programs published in PC Magazine are available by modem from PC MagNet, an on-line information service administered by CompuServe.

To download LASERLST.COM. log on to PC MagNet. Enter GO UTILITIES or choose PC MAGA-ZINE UTILITIES from the top menu, then DIRECT UTILITY DOWN-LOAD from the next. Enter the filename, then select the file from those presented. Answer (Y) to DO YOU WISH TO DOWNLOAD? Press Enter to see the transfer protocols. Choose a protocol and download the

To join PC MagNet, set your communications software for either 300 or 1,200 bits per second, 7 data bits, even parity, 1 stop bit, and full duplex. You can use any of more than 300 local access phone numbers, including: Boston, (617) 542-1796; New York, (212) 422-8820; Chicago, (312) 693-0330; or San Francisco, (415) 956-4191. To find the number nearest your dialing exchange after you have subscribed, or for 2,400-bps service, connect with PC MagNet and type GO PHONES. For Customer Service, call (800) 848-8990; in Ohio and outside the United States, call (614) 457-8650.

When you connect with PC Mag-Net, press Ctrl-C. At the HOST NAME PROMPT, enter CIS. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASS-WORD prompt and Z10D8907 at the ENTER AGREEMENT NUMBER

prompt. PC MagNet costs \$12.50 per hour for 1,200/2,400-bps service and \$6 for 300-bps, via MasterCard, VISA, or American Express. There is no additional charge for downloading source code or compiled programs from PC MagNet. These programs can be copied but are copyrighted and are made available only for noncommercial use. You may make copies for others as long as no charge is involved, but making copies for any commercial purpose is strictly prohibited.

Tear out and hole-punch the command summary on this page and add it to your DOS manual



LASERLST Command

Michael Holmes and Bob Flanders

April 11, 1989 (Utilities)

Purpose:

Formats text files so that the information of two standardsized pages is printed side by side on a single landscapemode page when printed with an HP LaserJet (or compatible) laser printer.

Format:

[d:][path]LASERLST infile [outfile] [/Tn]

Remarks:

The infile parameter designates the text file(s) to be printed. DOS "wildcards" (* and ?) can be used to designate multiple files, and a drive and path may also be included as part of infile.

By default, LASERLST sends its output to the standard DOS printing device, which is normally LPT1:. The optional outfile parameter can be used to direct the output either to another DOS device (LPT2:, for example), or to a disk file instead. The optional /Tn switch causes each tab character (ASCII 9) in the infile to be replaced in the outfile with n spaces. The default value of n is 8; other values up to 16 may be used.

The outfile produced by LASERLST contains the requisite formatting and printing escape sequences used by the HP LaserJet printers. The infile is printed in landscape mode with two 66-line by 81-character pages on each physical page. Files suitable for processing by LASERLST should be ASCII files that do not contain escape sequences of their own and do not require any specific word processor's formatting codes. LASERLST does, however, support underlining produced by a backspace and character strikeover. LASERLST may be used with files whose line lengths exceed 81 characters, but lines will be wrapped automatically at their 82nd character, and no provision is made for word wrap. LASERLST is especially suitable for printing program listings, README files, and rough drafts of text to be edited.

Available for downloading from PC MagNet (see the sidebar "LASERLST by Modem", LASERLST.COM is already compiled and ready to run. Alternatively, LASERLST.COM can be created from either of two program files, both printed in the article and available for downloading from PC MagNet. LASERLST.BAS will automatically create LASERLST.COM when you run it once in BASIC. Creating LASERLST.COM from the LASERLST.ASM source code requires the use of a macro assembler (IBM or Microsoft, Version 2 or later) and the following commands:

MASM LASERLST: T.TNK T.ASERT.ST: EXE2BIN LASERLST LASERLST.COM;

PC EXCHANGE PROGRAMMER'S WORKBENCH

dBASE AT THE SPEED OF C

The Power Environment for dBASE Programming

You dBASETM programmers know what xpressive and readable language dBASE is. It's a very comfortable development environment. But the price is deed performance Even compiled dRASE doesn't offer the speed that some users require these days. The kind of speed offered by software written in the C language. The answer is dBxTM, dBx translates dBASE to C. It offers you

a major competitive advantage over the next dBASE programmer. Keep writing in dBASE. Take every application all the way to completion. Then use dBx to translate them top to bottom to C

BRIEF/dBRIEF

Many worthy utility products supply needs that dBASE is programming

needs that dBASE*'s programming lat guage doesn't—dUTILTM, dFLOWTM

their output into your dBASE program

III and III Plus programming domain. Using BRIEF's underlying shell capabili-ties and its own interfaces, dBRIEF can

run external utility libranes, pluis dBASE itself, and link to the ClipperTM, Foxbase + TM and Quicksilver compilers, all with dBRIEF still loaded and running

the show It can do what BRIEF already

FOXBASE +2.10

New, FOXBASE +2.10 is laster, and more powerful than dBASE IV and it's avail able NOW FOXBASE +2.0 is already a PC Managine Editor in Choice, and has received an unbelievable 9.2 ration from infoworld FOXBASE, +2.1 has new

features such as built in support for pull

down and pop up menus, a new scree painter to create custom input screens, a

new advanced automatic applications

users to handle most database options

plus. Foxbase is still dBASE compatible

effortlessly and, much, much more

and contains hundreds of dBASE.

generator to write programs for you auto matically, a new user interface designed to allow both first time and experienced

The Fastest, Most Powerful, dBASE Compatible

Database Management System, NOW!

No longer dBRIEFTM, written in BRIEF's macro language, grabs hold of BRIEF and turns it into a complete dBASE

and a host of others. Trouble is, you have to use them separately, then combine

Other advantages C is nortable even to other operating systems like UNIX/ XeruxTM To the Macintosh or Amiga dBx gives your applications a passport to places dBASE cannot go Has its own file manager for single

user but links to major C file managersc-tree and dBC—for compatibility with dBASE files or multi-user support. We have everything you'll need, including

· Convert a screen layout into dBASE

Display dBASE file structures in

Indent automatically for clearc

windows, a great convenience alongside your program files.

Expand keystrokes into full dBASE

Create databases, index files, invoke Ashton-Tate's dFORMATTM and dCONVERTTM, draw lines and boxes

Simply marvelous programming e

vironment for writing and editing dBASE programs", PC Magazine, 7/86. Source code included!

Recurres BRIEF 1.32 or later and 384k.

enhancements. Run almost any dBASE program without modification. Foxbase

fully supports commands like Browse, 1/in Append, Create, Modify, Report, and Modify Label even in the middle of

a compiled program' Foxbase supports LMS memory and local area networks

foxBase + Version 2 10

Unlimited Runtine FoxBase • Mate User (LAN)

dunited Runtime CoxBase + 386

nlimateri Kuntime

LoxBase Macuntosh Unlimited Runtime

512k to run dBASE within dBRIEF: 640k and harddisk recommended

RRIFF / dBRIFF List \$275 Ours call

code for mieractive data entry

with Library Source Call for Full Source Pricing

NOVELL: BTRIEVE, XQL, XTRIEVE

Sophisticated Tools Essential For Fast Database Handling Btrieve is a library of subroutines that

allows the programmer to build a data hase application using any language. It takes complete charge of all file creation. indexing, reading, writing, insertion, deletion, forward and backward searching Its balanced tree indexing scheme finds any key in a million in less than 4 accesses. That's fast!

Btneve is multi-lingual also. It includes more than 20 language interfaces (includ-ing C, BASIC, PASCAL, FORTRAN). However if it turns out that you are using something a little unusual, worry not The manual includes a chapter on how to write a language interface to Ptrieve

Brneve's vital statistics are equally im-pressive. Files may have up to 24 indexes, fixed record length to 4090 characters. variable length to 64K, indexes to 255 characters, files of 4 billion bytes. Ne work support includes Novell, 3-COM, IBM PC NET. Software Link's Multilink and many others

XOL is a relational database manage ment system designed especially for pro-grammers. Imagine being able to access your database with the ease of SQL (Structured Query Language) statements and still having the power to process that

data night down to the byte level Think about your applications A large part of your software development effort is probably devoted to managing data stored in files on disk. Hours spent writand lines of code to search and store data records could have been used to program more important parts of your appli-cation. Why not let XQL do it for you XQL will increase your programming productivity and let you focus on building better applications.

The XQL system works in tandem with Btrieve and has an equally powerful chassis. No limit on the number of records per file Max file size is 4 giga-bytes. Max record size equals 4K, Max indexes per file is 24. The one version works for single or multiuser systems. DOS Ver 3.0 or greater. All languages

Xtneve is the final ingredient in the Novell programming recipe. It is a menu driven, data retneval system, that allows you to muckly find information and display reports System developers can easily customize Xtrieve to display com-mand menus, help files, and error messages in the English spoken by the customer. Xtneve screens then gives menu choices that users can quickly recognize. making Xtneve an easy product to use and understand

Report Option for printing customized reporte form lettere mails

Rineve

XOL Xtrieve

Btneve/N

Xtneve/N

Report Option/N

Last	Ou
\$245	\$1
\$595	54
\$795	\$5
\$245	\$2
\$595	\$4
\$145	\$1
\$345	\$2

GSS GRAPHICS SYSTEM Leave the Device Driving to GSS

For serious applications stick to the tools that stick to the standards. Not the least of reasons why GSSTM has emerged as the pre-eminent graphics toolmaker is that it has always conformed to ANSI standards.

At the heart of the system is the CGI standard Development Toolkit. It has all language interfaces and device drivers for keyboards, mice, joysticks, tablets, printers, plotters, cameras. The drivers completely insulate your application from concern for device viscemorac GSS Kernel TM conforms to ANSI's GKS

2b and has all its drivers and language bindings Macro level tools to draw, color, segment, transform, store and recreate an object. The Metafile Interpreter reads ANSI CGM files with full CGI capability

or recreation on various devices

Quality software? IBM thinks so They sell GSS under their own label. Royalties Needs 256k Last Ours CGI Dylpment Toolkit \$496 \$375

Kernel System Kernel System Kernel for IBM RT



MICROSOFT LANGUAGES Powerful Implementations Of The Most Popular

Programming Languages Microsoft C 5 0. The flagship of the Microsoft line runs up to 30 percent faster than its predecessor. Its new optimization features deliver untouchable execution speeds, 100 new additional library

Microsoft Macro & SSFMBLER S.O. II you ever wanted to take on the challenge of assembly here's your opportunity MASM" 5.0 is a lot easier to use, has completely revised documentation, and a new "Mixed Language" programming guide that gives you step by step instructions for linking your assembly code with other Microsoft languages Microsoft QuickBASIC 4.0: is a revolu-

tionary concept in BASIC programming It allows you to run, edit, debug, and run again. Our friends at Microsoft have elim-inated the dreaded compile step. When-ever you edit your code OB4 automa-

tically incorporates your changes, so that it can run a program of 150,000 lines in ess than a minute es than a number Each member of this language family cludes the renowned debugger

CODEVIEW Microsoft C Microsoft Macro-ASSEMBLER Microsoft QuickBASIC Microsoft FORTRAN

\$150 \$109 \$ 99 \$ 66 \$450 \$296

\$247 \$333 \$397 \$467 \$397

CLIPPER R&R RELATIONAL REPORT WRITER

MORE PROGRAMMING TOOLS FOR... dBASE, C, FORTRAN, BASIC, COBOL, PASCAL

dbc ISAM, FoxBASE, Greenleaf, Halo '88, Logitech MODULA, MicroFocus COBOL, Norton Utilities, Panel Plus, Periscope, Phoenix, Polytron, RM/COBOL, Sprindrift, Tom Rettig's Library, Windows for Data, and many more.

Call or write for prices and information.

1-800-DIAL-PCX 30 DAY MONEY BACK PC EXCHANGE***

OVERNIGHT SOFTWARE DELIVERY CIRCLE 395 ON READER SERVICE CARD





RING VALLEY, NY

TELEX: 667962 (SOFT COMM NYK)

UTILITIES

er to go to the start of the next page. This character is not directly sent to the printer, however, but is intercepted so that the program can shift the printhead from an odd-numbered page to an even-numbered page without causing the printer to print and eject the sheet. Only when a form feed (or end of page) is encountered on an even-numbered page is an actual form-feed character sent to the printer to signal the start of the next physical page. It's interesting to note that, whether maintained in AS-CII or binary, the last bit in the page number can be tested to determine which side of the page is being completed.

The only other character interpreted by the program is the printable character that would occupy the 82nd position in the line. Any such character causes a carriage return—line feed sequence to be output before the character itself, creating a line wrap.

The backspace character moves the printhead one character to the left, causing an overprint of the previous character.

When the end of file is encountered, PRINT is called with a parameter that tells it there is no more data. At this point, the EPILOGUE routine is called to finish printing the current file and reset the printer routine to its initial state for the start of the next file. If one is found.

LASER PRINTER INTERFACE Al-

though the output may be saved as a DOS file, the ultimate target, of course, is the laser printer. LASERLST must embed the proper codes—escape sequences—in the outfile to tell the printer how to print the data. There are several rules that govern how the printer repards those sequences.

First, the printer looks for the ESCAPE character (27 decimal, 01B hex.) as the start of any commands directed to it. With a versatile printer such as the HP Laserlet, escape sequences can command a wide range of actions. The commands used by LASERLST are explained in Figure 3.

The specific characters that follow the ESCAPE tell the printer which functions to perform, of course. You will note that each sequence ends in a capital letter. This is because Hewlett-Packard's printer language permits several commands to be combined in a single string. In the sequence

&a@r9@m88L

PC

Laser Printer Command Strings

н		
l	&I10	This string puts the printer in landscape mode, which causes it to print across the 11-inch length of the page rather than the 8½-inch width. The

- The ESC E sequence causes the printer to be reset to its power-up setup values. This sequence is sent at the beginning and end of each file printed.
- (s17H This sets the *font pitch* to 17 characters per inch, which permits a full 162 characters to be printed with enough left over for the border and separator
- lines.

 8.15.14C This escape sequence sets the *vertical motion index*, the amount of space the printer puts between the top of one line and the top of the next. The
- value 5.14 is the number of 1/48-inch increments to be used for each line.
 This translates into .1071 inch per line or 79 lines per page.

 471F
 This sets the text length, the maximum number of lines that may be printed.
- In is sets the *text length*, the maximum number of inless that may be printed before the printer will automatically eject the current page. In LASERLST, the page is not ejected, because the program relocates the cursor before the end of page is encountered.
- &I6E This sets the top margin, the area above the title line.
- (s-3B This sets the *stroke weight*, which tells the printer how bold the characters should be.
- &a0R This command causes the next position on the page to be the top printable line on the page.
- line on the page.

 &a5L These commands tell the printer where to put the left margin. It is
- **&a88L** set to 5 during the left-hand page print, to 88 for printing the separator bar, and to 91 during the right-hand page print.
- &a85M These commands tell the printer where to put the right margin. It is set to 85 during elter-side print, to 95 while printing the vertical bar.

 &a171M and to 171 during right-hand print, to 100 while printing the vertical bar. accurs before the left margin set because the printer will not allow the left margin to be set beyond the right margin.
- &dD This command turns on underline mode.
- &d@ This command turns off underline mode.

Figure 3: The command strings used by LASERLST. Each string begins with the escape character, but only the characters following the escape are shown.

there are actually three commands. When lowercase letters are used (for instance the r and m in the above string), the printer knows that another command sequence immediately follows. While this is clearly noted in the technical documentation for the printer, it may be overlooked when reading a program such as LASERLST, whose command sequences are simple and backen un.

While it is not very useful for those with N

dot matrix printers, if you have access to a laser printer, you'll find LASERLST to be a reasonably speedy program that prints certain types of files in a very readable format. And just think of the trees you'll save.

Michael Holmes is vice-president and senior systems analyst and Bob Flanders is president and senior systems analyst at NCI Systems Inc. in Annandale, Virginia.

Before you buy a printer, get a second opinion.

"The Quickwriter is a 24-pin printer built to run forever, very quickly."

Recently, in PC Magazine's Fifth Annual Printer Issue, the editors gave our IBM Quickwriter their prestigious Editor's Choice Award.

The competition was stiff and the testing demanding. In selecting the IBM Quickwriter Printer For a copy of the coing. In selecting the IBM Quickwriter Printer PC Magazine Quickwriter as the crème de la crème of its class, the knowledgeable lab experts at PC Magazine scrutinized printers of virtually every brand name, with every

It was under these conditions, and in a very tough category, that the Quickwriter came out of the pack with

speed, and at every price range.

flying colors:

"...IBM has hit on a winner..."

When they chose the Quickwriter as number one, they considered the look of its crisp executive type and the quality of its graphics, with either film or fabric ribbon, and this is how they described what they were looking at:

"It's gorgeous."

When they examined our Quickwriter for design, durability, speed and ease of use, they used some very impressive language:

"IBM designed this obviously heavy-duty device to run without fail for a very long time."

And when they saw that our Quickwriter was the fastest IBM impact personal printer ever, that it was the only one that could go from letterhead to envelopes

automatically, in seconds, and that it could do multi-part forms and spreadsheets beautifully, they simply concluded:

"...this is a printer without peer."

To see the IBM Quickwriter in action, see your IBM Authorized Dealer or your IBM marketing representative today. For a copy of the com-

review, or to find the dealer nearest you, call 1 800 IBM-2468, ext. 118. And put your money on a





GIVE US HALF AN HOUR AND \$299 AND WE'LL **GUARANTEE YOU A FULL FEATURED NETWORK.**

THAT'S ALL it takes to turn two IBM or compatible PC's into a true network. Half an hour or less to install MainI an and \$299 for

MainLan's complete starter pack.

And if you want to add 1, 2 or more, it's just a matter of \$199 for each additional computer.

An inexpensive way to turn your fragmented, unsociable collection of computers into a fully functioning network,



The MainLan Starter Pack-everything you need to connect two computers, including two network boards, software, documentation, and two 16.5' shielded cables with terminating plugs. The Extension Pack contains the network board, and one cable and plug set.

sharing printers, making files, data and hard disks available to anyone who needs them, giving you electronic mail and the comfort of security.



FRIFNDLY I AN

MainLan's menu system lets you spend your time working instead of learning how to make it work. To transfer or manipulate files, redirect printer output, or send E-mail, just press the appropriate key. You can be a full-fledged member of the network while using as little as 50k. All this at a transmission rate of 4 Mbps.

_ Money Order or Cashiers Check_

CITY TELEPHONE

Signature_

Account Number

LAUDABLE LAN

Don't just take our word on it. "PC WORLD" in England says "MainLan is a revolutionary way of operating in a multiple machine environment without having to make all of the usual sacrifices. It has the potential to be the low-cost networking standard of the future" The kind of features that earned

1 Starter Pack	\$299.00 + \$10 Shipping & Handling*
Extension Pack(s)	\$199.00 + \$10 Each Shipping & Handling*
TOTAL**	
*Shipping via UPS Blue. **Florid	la residents add 6% sales tax.
Payment may be by Visa, MasterC	ard, money orders, cashiers check, or C.O.D.s. Purchase Orders
(hardcopies only) are accepted fro-	m Fortune 1000 companies, and educational, medical, military
and government installations. Plea	ise note method of payment below.
NAME	
COMPANY	
ADDRESS	

STATE

Visa_

Expiration Date,

Yes, I want to see what MainLan's full-featured LAN will do for me. I understand that I may return it

anytime within 30 days, for a full refund if I am not completely satisfied.

MainLan the PC MAGAZINE FDITOR's AWARD at the 1988 British Personal Computer Awards. That's MainI an

COMPATIBLE LAN

Because MainLan is NETBIOS compatible, you can run most of the popular multiuser NETBIOS compatible applications programs without modifications. Supports file and record locking.

THRIFTY LAN

MainLan is easy on your pocketbook, too. Our unique hardware design costs less to produce-and you enjoy the savings. You'll also enjoy not having to have an expensive network server.

THE FEATURES

- NETBIOS compatible
 - 4 Megabits per second transmission rate
 - Needs as little as 50k RAM
- Printer Sharing
- Hard Disk Sharing (Virtual Drive)
- 90 days free support

THE GUARANTEE

It's simple. Try MainLan at our special introductory offer of \$299 for the 2-PC Starter Pack (regularly \$399), and if it's not what you want in a LAN, return it within 30 days and we'll return your money. The MainLan Extension Pack for one PC is \$199 Limit of one Starter Pack per customer site, please.

US Sage, Inc. Department CJ1 2005 Tree Fork Lane, Suite 125 Longwood, FL 32750 (407) 331-4400 FAX (407) 331-4406



CALL TO ORDER

How to move the timeline window



Continuing to explore ways of using nonstandard windows in Presentation Manager programs, we'll see how easily you can add your own moving logic to TIMELINE.

In the last issue, I presented a somewhat unusual Presentation Manager program called TIMELINE, which displayed the date and time in the lower-left corner of the screen. The unusual thing about the program was that it omitted all the child windows normally found in PM programs. This let you see for yourself that the child windows—the title bar, system menu, and minimize/maximize buttons (as well as the sizing border displayed by the frame window)—are programmers' options rather than requirements.

Of course, the functionality of TIME-LINE was consequently reduced. Without a sizing border or minimize/maximize buttons, TIMELINE cannot be resized or minimized. But since TIMELINE was designed as a fixed-size window, these features are not missed.

Playing with it myself, however, I decided that the absence of the title bar was a more-serious limitation. One of the purposes of the title bar is to allow a window to be moved around the screen. Lacking this, the TIMELINE window can't be moved. It just plunks itself down in the lower-left corner of the screen and refuses to budge. I suggested last time that TIME-LINE could have included its own moving logic, even though it didn't. Some readers may have concluded that adding such a feature would be difficult.

Adding your own window-moving logic isn't really hard at all, however, and this column will show you how to do it. Moreover, the new version of TIMELINE will 'remember' where it was last moved and automatically out itself there the next time you run the program. So if you'd prefer that TIMELINE sit in the lower-right corner of the screen (for example), you need only move it there once.

WHAT THE TITLE BAR DOES Normally, when you create a standard window for a Presentation Manager program, you include the FCF_TITLEBAR identifier among the frame-creation flags. This causes the Presentation Manager to create a title bar across the top of the window. The title bar serves several functions.

First, the title bar displays the name or title of the program. Programs that work with files (such as word processors) often use a title bar to display the name of the file being edited.

Second, the title bar changes color to indicate whether its program is the "active" window or not. The active window always appears on top of the other windows, and it receives any keyboard input.

■ The new date program will "remember" where it was last moved and automatically put itself there the next time you run the program.

Third, as I indicated, the title bar is responsible for supporting the movement of windows around the screen. The easiest way to move a window is to press button I on the mouse while the mouse pointer is positioned over the title bar. A rectangular frame (the same size as the window and as wide as the program's border) is then displayed. You simply move this frame by moving the mouse and when you release the mouse button the window moves to the new position.

You can also move the window by using the keyboard. You can select Move
from the system menu or simply press AltF7. Again the rectangular frame is displayed and you can move it with the cursor
movement keys. Pressing Enter ends the
move operation; pressing Ese aborts it. Indeed, if you wish, you can even combine
the keyboard and mouse when moving a
window.

Now normally, of course, a program shouldn't attempt to draw anything outside its own window, since in doing so it could interfere with other programs that are displaying something on their windows. Yet the rectangular frame used for moving the window seemingly breaks this rule.

You'll notice, though, that when the rectangular frame is displayed, all other parts of the screen are frozen and cannot be updated. (For example, if you run the RANDRECT program, from the November 29, 1988, Environments column, you'll see it stop when you begin a moving operation.) It is this characteristic that allows the frame to be displayed and erased while it is being moved without affecting the property of the property

■ ENVIRONMENTS

```
aDataSizs - sizeof ptlPosition ;
TIMELINE.SUB -- Substitute window procedure and new function for TIMELINE (c) 1989, Elff Communications Co. FC Magazine * Charlez Petsold, November 1986
                                                                                                                                               if (WinQueryProfileData (hab, szAppWame, zzKeyWame, intlPosition, isDataSize))
                                                                                                                                                                                               me, MULL, (SHORT) ptlPosition.x,
(SHORT) ptlPosition.y,
0, 0, SHP MOVE);
                 ow (MMMD hymdPrame, POINTL *cotlPosition, BOOL freyboard)
    TRACKINFO ti :
                                                                                                                                               WinStartTimer (bab, hwnd, ID_TIMER, 1888) ; return 0 ;
          meryWindowRect (hwndFrame, ati.rclTrack);
anWindowPointe (hwndFrame, MWND DESKTOP, (FPOINTL) ati.rclTrack, 2);
                                                                                                                                        case WM TIMER:

hps = WindetPS (hwnd);

UpdateTime (hwnd, hps);
    ti.fs = TF_NOVE | TF_STANDARD | TF_ALLINBOUNDART | (TRevboard 7 TF_SETPOINTERPOS : 8) :
                                                                                                                                               WinReleasePS (hpe) ;
return 0 ;
   ti.ptlMiwTrackSise.x = 0 ;
ti.ptlMiwTrackSise.y = 0 ;
ti.ptlMiwTrackSise.x = ti.rclTrack.xRight = ti.rclTrack.xLeft ;
ti.ptlMaxTrackSise.y = ti.rclTrack.yTop = ti.rclTrack.ySottom ;
                 undary.xLeft = $ ;
undary.yRottom = $ ;
undary.yRottom = $ ;
undary.yTop = WinquerySysValue (EMMD_DESKTOP, SV_CXSCREEM) ;
undary.yTop = WinquerySysValue (EMMD_DESKTOP, SV_CYSCREEM) ;
                                                                                                                                                                                              // fall throug
                                                                                                                                        case MM SUTTOWIDOWN: WinsetActiveWindow (MMMD_DESKTOP, bwnd) ;
                                                                                                                                                if (MoveWindow (bwndFrame, aptlPosition, mag -- WH CHAR))
   if (WinTrackRect (HWHD DESKTOP, NULL, 5ti))
           pptlPosition->x = ti.relTrack.xLeft;
nptlPosition->x = ti.relTrack.xLeft;
                                                                                                                                                       WinWriteProfileData (hab, azappWame, azKeyWame, 
&ptlPosition, sizeof ptlPosition);
           return TRUE :
   return FALSE :
                                                                                                                                               WM PAINT:
hpW = WinDeginFaint (bwnd, MULL, MULL) ;
OpiErase (hpe) ;
  ULT EXPENTRY ClientWodProc (HWHD bwnd, USHORT meg, MPARAM mpl, MPARAM mp2)
   {
static CRAR száppName() = "TIMELINE",
szkeyName() = "POSITION"
atatic HMHD hvmdFrame;
HPS hoa;
                                                                                                                                               UpdateTime (hwnd, hpz) ;
                     hps;
ptlPosition;
aDataSize;
   POINTL
                                                                                                                                               WinEndPaint (hps) ;
    ewitch (mag)
                                                                                                                                        case WM DESTROY:
WinstopTimer (hab, hwnd, ID_TIMER) ;
rsturn # ;
          Cass WM CREATE:
SizeWindow (hwnd) ;
                                                                                                                                 return WinDefWindowProc (bwnd, mag, mpl, mp2) :
                          rame - WinQuaryWindow (hwnd, QW PARENT, PALSE) ;
```

Figure 1: The two functions in TIMELINE.SUB replace the original ClientWndProc in last issue's TIMELINE.C to add the window-moving logic.

the windows of other programs.

Obviously, the title bar has access to a very powerful mechanism here. But it's nothing that you can't implement for yourself. It's a function called WinTrackRect. The title bar uses this function when you move a window, and the frame window uses WinTrackRect when you resize the window. Thus, WinTrackRect looks like the perfect solution for adding move logic to TIMELINE.

THE NEW TIMELINE Figure 1 shows a listing called TIMELINE.SUB. To create the new version of the TIMELINE program, you remove the Client WndProc function from the TIMELINE.C listing presented in last issue's Environments column and substitute the two functions in TIMELINE.SUB. You can then use the same TIMELINE.SUB. You can then use the same TIMELINE definition file shown last time to recompile the program.

The new version of TIMELINE is movable. Just press mouse button 1 while the mouse pointer is positioned over TIME-LINE's window and the rectangular frame will be displayed. Move it with the mouse to another part of the screen and release the mouse button.

There is also a keyboard interface. If

■ WinTrackRect freezes the window, displays the rectangular tracking frame, and allows it to be moved around the screen.

you don't have a mouse installed, bring up the Task Manager and select TIMELINE from the list of programs. This makes TIMELINE the active program and gives it the input focus. Now press Alt-F7 (the same key combination used for moving other windows) and move the window with the cursor movement keys. Press Enter when you're finished or Esc to cancel the move operation.

The new version of TIMELINE contains a slightly longer ClientWndProc and has one additional function, named MoveWindow. This function is called from ClientWndProc during processing of the WM_BUTTON1DOWN message. Naturally enough, that's the message that tells a program when the first button on the mouse has been pressed. In response to a WM_BUTTON1DOWN message, ClientWndProc calls WinSetActiveWindow to make TIMELINE the active window and then calls MoveWindow.

THE WinTrackRect FUNCTION

The main job of MoveWindow is to call WinTrackRect. The WinTrackRect function freezes the window, displays the rectangular tracking frame, and allows the frame to be moved around the screen. The

AND THEN NORTHGATE CREATED...







The Dictionary Defines "ELEGANCE" as: "Beauty of Style...Scientific Precision"



A Totally New Lineup of Five 80386-Class SuperMicro Computers Redefining the Standards For Power Computing!

FASTEST 386 EVER! UP TO 16 MEGABYTES OF MEMORY, A 256KB READ/ WRITE-BACK CACHE, UP TO 1.2 GIGABYTES OF SCREAMING-FAST HARD DRIVE STORAGE. 16-BIT VGA DISPLAYS, THE OMNIKEY KEYBOARD AND CABINETRY LIKE



YOU'VE NEVER SEEN BEFORE.

If you need the ultimate in pure computing power, blended with every imaginable convenience and utility feature. Northgate's all-new Elegance Series is for you-AT PLEASINGLY (NOT SUSPICIOUSLY) LOW PRICES!

At the top of the line—the Elegance 3000, it's housed in a deluxe floorstanding cabinet with space for 10-Yes 10-half-height storage devices, with a tinker-proof locking, full-length front door panel. 250-watt dual fan power supply with thermistor sensor to automatically control ventilation requirements

Just try filling the drive slots. Northgate gives you both 1.2 and 1.44 floppies standard. Hard drive selection is up to you. From our 80MB SCSI with 17MS speed to dual 600MB SCSI or ESDI drives for a maximum capacity of 1.2 gigabytes. Plenty of space left over for more floppies, optical drive, tape backup, etc.

Inside lives the lightningi The 16 megabyte capacity motherboard is hyperenhanced with 256 Kbytes of 30 nanosecond cache. But it's not just a read cache as with most systems. Our engineers have added a write-back algorhythm that adds another boost to the already scorching processor power.

Re-calculations of even the biggest spread sheets are amazingly quick. Large databases are short work with Elegance. CAD drawings appear as fast as you can release the ENTER key.

And if you're tired of going out to lunch while a desktop publishing or graphics program struggles through your current system. Elegance will put you on a diet! The speed of these systems cannot be believed without experiencing it for yourself.

Northgate will custom configure your Elegance System to your own needs. Options include 16-Bit VGA displays, tape backups to 150MB, a huge range of hard drives, network software and hardware, laser printers...just call.

Yes, Elegance Systems are not for everyone. Northgate has a broad line of top performance systems to meet any computer need. Our 286 family includes our PC Magazine, Editor's Choice 286/12 and both 16 and 20MHz complete systems. Northgate's entry level 386 system is our 16MHz selling for just \$2699.

Whatever your computer needs, you're further ahead with Northgate. Backed by our unique OVERNIGHT PARTS REPLACE-MENT POLICY and supported by the industry's most qualified technical support staff. Northgate is truly "The New Leader in State-Of-The-Art Power Computing."

Elegance Systems prices for 20MHz complete systems start at \$4,699. For 25MHz systems, prices start at \$5,299.



NORTHGATE COMPUTER SYSTEMS, INC.

13895 Industrial Park Blvd., Suite 110 Plymouth, Minnesota 55441 From Foreign Countries call: Corporate Headquarters (612) 553-0111 • FAX (612) 553-1695









HOURS M-F 7am-8pm CST, Sat. 9am-3pm CST New Canada Toll-Free Order Hotline: 1-800-338-8383

FINANCING: Use the Northgate "Big N" revolving credit card instead of tying up Visa or MC credit. Millions in financi to qualify. OR...Lease a Northgate with up to five-year terms. Ideal when cash flow is important. Phone for details For corporate and Institutional sales in Texas. Louisiana and Oklahoma, call (512) 343-7591. Northgate. Elegance, and OmniKey are trade marks of Northgate Computer Systems. Inc. All other products are trademarks or registered tradenames of their respective companies

■ ENVIRONMENTS

function returns when the user releases the mouse button or presses Enter or Esc.

A facility such as WinTrackRect must be versatile enough to be used for many purposes. As you can see from the listing, most of MoveWindow is devoted to setting up the fields of a TRACKINFO structure that is passed to the WinTrackRect function. This structure has 15 fields, including two that are POINTL (point) structures and two that are RECTL (rectangle) structures. Not all of them need be set for some uses of WinTrackRect.

The reITrack field of the TRACKINFO structure is a RECTL structure that contains the initial size and position of the tracking rectangle relative to the lower-left corner of the screen. MoveWindow gets this information by calling WinQueryWindowRect, which returns the size and position of the frame window relative to the frame window's lower-left corner. It then translates this information into screen co-ordinates by calling WinMapWindow-Points. When WinTrackRect returns, the reITrack structure contains the new size and position of the tracking rectangle.

The fs field of the TRACKINFO structure is a series of flags (encoded in a USHORT) that describe how WinTrack-Rect is to function. The most important flag in this case is TF_MOVE, which sets conditions so that the track rectangle retains the same size and can be moved around the screen.

The cxBorder and cyBorder fields of TRACKINFO contain the width of the rectangular frame that WinTrackRect draws. When you specify TE_STAN-DARD in the 5 field, these dimensions are multiples of the standard border width. The cxKeyboard and cyKeyboard fields specify how many pixels the track rectangle moves for each cursor keypress.

The ptlMinTrackSize and ptlMax-TrackSize are really more important when you're using WinTrackRect for sizing rather than moving, but initializing them is still required.

The rclBoundary field is another RECTL structure. It specifies the limits within which the tracking rectangle can be moved. For the modified TIMELINE, I've allowed movement anywhere on the screen. The TF_ALLINBOUNDARY flag indicates that all of the tracking rectangle.

gle is to remain inside this boundary.

WinTrackRect returns TRUE if the tracking operation ended normally and FALSE if it was canceled by the user with the Esc key. If WinTrackRect returns TRUE, MoveWindow returns the new lower-left corner of the relTrack structure to ClientWndProc by setting the fields of a POINTL structure pointed to by pptlPosition. If MoveWindow returns TRUE, then ClientWndProc uses WinSetWindowPos to set the window to the new position.

THE KEYBOARD INTERFACE Once this logic is in place, adding the keyboard interface (which uses the normal Alt-77 key combination to initiate the move) is fairly simple. ClientWndProc processes WM_CHAR (keyboard) messages and checks if the key is a virtual key (that is, not a character key), if the Altkey is down,

 You can set system colors from the
 Presentation Manager Control Panel program.

if the key is being released, and if the key is F7. If none of these conditions exist, then the WM_CHAR processing simply breaks. Otherwise, the WM_BUTTONI-DOWN message is executed.

There is one noteworthy difference between initiating the move operation with
the mouse and with the keyboard. You'll
notice that ClientWndProc sets the last parameter to MoveWindow to TRUE if the
move operation originated from the keyboard and to FALSE if it originated from
the mouse. If this parameter is TRUE,
MoveWindow includes the TF_SETPOINTERPOS flag in the fs field of the
TRACKINFO structure.

During the WinTrackRect call, the mouse pointer stays in the same position relative to the tracking rectangle. If you initiate the tracking from the mouse, is already positioned over the window, which is fine. But if a mouse is installed and you initiate the window move via the key-

board, the mouse pointer might be in some other part of the screen. It would look odd to see it move when you move the track rectangle. The TF_SETPOINTERPOS flag causes WinTrackRect to move the mouse pointer to the center of the rectangle when the tracking begins.

THE OS2.INI FILE As you probably know, you can set system colors and other preferences from the Presentation Manager Control Panel program. The Control Panel stores the values you select in a file called OS2.INI. (The extension of this file stands for "initialization" and is usually pronounced to thyme with \$kinm.)

The OS2.INI file can be used by any other Presentation Manager program that needs to store and retrieve configuration or initialization information. Several functions are provided for this purpose.

Each entry in the OS2. NI file is identificially an application name (generally the EXE filename without the extension) and a key name, which the program uses to identify the data. An application can use multiple key names to store items.

TIMELINE uses this facility to store the new position of the window and retrieve it the next time the program is run. The application name is TIMELINE and the key name is POSITION.

After setting the new window position during the WM_BUTTONIDOWN message. TIMELINE calls WinWriteProfile-Data to store the POINTL structure containing this position. (You'll notice a disk access whenever you move the window. This is the Presentation Manager writing the information to OS2.INI.

During the WM_CREATE message, the organic calls WinQueryProfileData to read in the values. If WinQueryProfileData cannot find the entry (which will be the case the first time the program is run) then the function returns FALEE. Only if the function returns TRUE does TIME-LINE use the POINTL structure to set an intital window position.

In the DOS world, the use of configuration files is usually restricted to large programs because they can add a lot of overhead to small utilities. But the facility built into the PM is so easy to use that even simple or programs like TIMELINE can store configuration information.

PC Magazine, Jan. 31, 1989, awarded Northgate's 286/12SM system its highly respected...



EDITOR'S CHOICE

PC Magazine said:

"Speed by design: it's clear that Northgate Computer Systems values quality for the dollar with an emphasis on speed. The hardware and software components used in the Northgate 286/12 are chosen to give the most pep for the fewest dollars.

While the 286/12 is not the leastexpensive fully configured system in this series, it simply gives more of everything."

"If you want a system designed with performance and expansion as top priorities, consider this system seriously."

100% Customer Satisfaction!

That's the <u>BEST</u> reason Northgate's 286/12SM <u>complete system</u> deserves <u>Your Choice</u>" as your next computer!

Unpack the carton, plug it together. Turn it on. The already formatted hard drive purrs. Up pops the C> prompt. Type DIR. Zip. Files fly by so fast you have to freeze the screen to read them.

Then you notice...68 megs or more of RLL hard disk storage. No partitions either. Northgate gives you MS-DOS 4.01 with this system. Most others don't even include DOS. They charge extra. Including Dell.

Now...take it for a test drive. Load your programs. Finished so fast? Run 1-2-3. Thy a re-calc. You hardly get your finger off the Enter key before it's done. You don't know what fast is 'til you've run this baby.

And the 286/12SM exudes quality. No cheap, old fashioned 12" monitor. Herés a high quality 14" graphics monitor, or even better, a true 16-bit (not 8-bit) VGA graphics monitor puts 256 colors on the screen. Simply magnificent.

More quality: Wait until you discover data entry with Northgate's exclusive OmniKey. Crisp, positive entry. With the F keys on the LEFT WHERE THEY BELONG!

You can't buy OmniKey anywhere but Northgate! And it comes standard with all our systems. Uncertain about how to install a modem from another system? Call Northgate For Tech Support by the most knowledgeable staff anywhere. Top quality people who aren't satisfied until you are

Let's say something goes down it does happen! Call Northgate Immediate diagnosis over the phone. If a user-replaceable part is needed, it's on the way to you the day you call by overnight express. AND NORTHOATE PAYS THE REFIGHT That's SERVICE!

Installation is a snap, and if you have questions, Call Northgate We'll walk you through the fix so you're up and running again without waiting days for a "delivery kid" from one of those third party service companies.

Yes, you may pay a few dollars more for this system. But you know you're dealing in the Big Leagues with Northgate! So if you're going to settle for less and buy at the lowest price, without concern for League Leading Performance, call the other guys!

But if you want the 286/12 system that sets a new standard in the industry, backed by a company that just won't let you down, CALL NORTHGATE. Complete System Price
\$2,19900
Fully configured with 68 MB hard
drive. 14" monitor. 1.2 MB and
1.44 MB Roppy drives.
Omnikey/102 keyboard
AND MORE...

No lightweight this... full expansion capabilities, features and performance no other complete system can offer at the price





gives you a full 1MB of usable RAM. So you can use 384K for your applications. And system performance is unaffected. Now wave compare prices!

The 286/12SM board has serial and parallel ports built in:The board has two 8-bit and four 16-bit slots. A special memory board slot we call "Lightning Alley" runs at processor speed—12MHz—not 6 or 8 MHz as do others. That's as much as 100% faster!

One megabyte of RAM can be installed on the motherboard. Memory cards enable a total of 16MB to be installed in the system. Two floppies, too, so you can use 1.2 and 1.44MB diskettes, as well as 360's and 720's.

Let's talk differences and what makes Northgate a better value. Many systems have IMB of RAM (including Dell, CompuAdd). BUT...only 640K is usable. The other 384K is "shadowed."

That means the system ROM and video ROM occupy the other 384K you paid for. Without your being able to use it! No RAMDISK! No Disk Caching! No Spoolers. And you can't use SmartDrive for Windows—want to see what 54LOW is? Thy it.

Northgate performance is as good or better and gives you more for your money.

Phone Now...Let Northgate begin building your computers... Today!

1-800-548-1993

Hours M-F 7 am-8 pm CST., Sat. 9 am-3 pm CST New Canadian Toll-Free Order Hotline 1-800-338-8383

TERMS: VISA. MC. COD. Credit Card. Pre-Payment (allow 2 weeks for personal checks to clear). Wire Transfer and Purchase Orders for Rated Accounts. We also ship to APO and FPO. All shipments are FOB Minneapolis. MN.

For corporate, government and institutional sales in Texas, Louisiana and Oklahoma, call (512) 343-7591.

13895 industrial Park Boulevard, Suite 110, Plymouth, Minnesota 55441 From Foreign Countries call: Corporate Headquarters (612)553-0111 * FAX (612)553-1695

Other specifications and standard features that make this NORTHGATE "YOUR CHOICE":

- Processor—Intel 80286/12 (not a 10).

 Cabinet—Full size desktop case; control panel with system reset button, speed switch (8/12MHz), hard drive inuse light, 200-wat power supply.

 Hard Drive—Microselence 68MB.
- 28MS access time.

 Controller—16-bit. R.L. 1:1 interleave
- Controller 16-bit, RLL, 1:1 interleave for 800,000 BPS data transfer.
- Famed OmniKey/102 keyboard—pick of the pros.
- Floppies—One 1.2MB 5¼ inch; one 1.44MB 3½ Inch.
- Monitor—14" flatscreen, amber or white, 1000 line resolution capability.
- white, 1000 line resolution capability.
 Video Adapter—Hercules compatible with parallel port.
- Software—Northgate MS-DOS 4.01 with GWBasic, hardbound covers: PCKwick hard drive caching: Northgate System and DOS on-line user's guide: Northgate Utilities.

All systems are custom configured and manufactured at our production facility in Plymouth, Minnesota, Approximately 80 percent of parts used in Northgate systems are made in the U.S.A.

Hard drive is factory-formatted (we can do this legally because we are a DOS licensee) and system can be unpacked and ready for operations on site in about 10 minutes. Full instructions (written and printed in English) are provided.

SYSTEM OPTIONS: Display—16-bit VGA Greyscale, Analog or Multisynch.

Hard Drives—Up to 600MB, SCSI, ESDI, RLL (Northgate believes MFM drives are obsolete)



FINANCING:

Use the Northgate "Big N" revolving credit card instead of tying up Visa or MC credit. Millions in financing available, easy to qualify.

OR...Lease a Northgate with up to five-year terms. Ideal when cash flow is important. Phone for details.

Northgate and Omnikey are trademarks of Northgate Computer Systems. Inc. All other products that are trademarks or registered tradenames of their respects companies.

Because Resources Should Be Shared



BayTech engineers resource sharing solutions.

Because we know your applications for sharing printers, plotters, modems and data are unique, BayTech has developed over 30 resource sharing products, which offer you a broad range of solutions for sharing your resources.

We realize that you shouldn't have to fit your application to the specifications of a single product. With BayTech, you select the model that meets your needs.

From simply sharing one or more printers between computers, to creating a complete network of computers, printers, plotters and modems, BayTech has a product designed for you.

Call us toll-free today. Our technical support staff will show you how to make the most of your resources. BayTech

Data Communications Products Division 200 N. Second Street, P.O. Box 387 Bay St. Louis, MS 39520 USA FAX: 601-467-4551 Telex: 910-333-1618 BA YTECH Phone: 601-467-8231 or toll-free

800-523-2702

AN INTRODUCTION TO INDEXED FILES



The pros and cons of different kinds of indexed files and file-index structures are explained, and two programs are included to let you experiment with the various techniques.

In the last two columns, we've briefly discussed sequential files and nonin-dexed random-access files. It's now time to take a look at indexed random-access files, the type most likely to be used by your favorite Brand X database program.

When information is stored in an indexed data file, the body of each data record is stored in a main file and an abbreviated form of the data, usually consisting of a key field and a record number or pointer, is stored in a separate index file. The key field is the element of a record that you will want to match when you search for the record later. Typically, the search key might be a customer name or account number. It's fairly common for a data set to be indexed on several different key fields, so that there are several index files associated with the same main data file

When a program needs to locate a particular record, it first inspects the appropriate index file to try and locate the search key (name, account number, or other) for the record needed. If a matching index entry is found, the record number or position is extracted from the index and used to fetch the desired record from the main data file.

The basic premise of an indexed data file is simple. Because the index is only a subset of the entire data set, it is much smaller and can be searched much more rapidly. In fact, even when the main data file is many megabytes in size, it is usually possible to hold the entire index in memory at once. Moveover, within the index file, you can use special structures and tech-

niques to maximize the speed of searches that would be impractical within the main data file.

ORGANIZING THE MAIN FILE In some simple databases, both the index file and the main file are kept sorted in the same order, as seen in Figure 1. This approach has several minor advantages. For one thing, because it does not need to contain any record numbers, the index file is quite compact. Instead, the position of a particular key in the index file directly indicates the position of the corresponding record in the main data file. Another advantage is that you can use the index file to find a particular starting record and then process records sequentially in the main file without further reference to the index.

The ordered-main-file approach also

has some severe disadvantages. First, since the main file can be sorted only one way at a time, if you have several different indexes, you must decide which is to be the "primary" index. The subsidiary indexes must use a less-compact structure that includes record numbers.

More important, however, the orderedmain-file strategy brings with it all of the inconveniences of nonindexed ordered files that we discussed in the last column. Each time you add or delete a record, or update the key field in a record, you must nove around a lot of other records in the main file as well as update the index file(s). This exacts a heavy price both in execution time and in the free disk space needed to carry out an update safely.

A more common and more efficient approach, then, is to decouple the order of

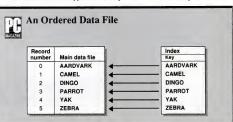


Figure 1: A data file in the same order as its index file. While conceptually simple, this approach is very inefficient if the data is not static, since much data must be moved when records are added, deleted, or changed.

■ POWER PROGRAMMING

the records in the main file from the order of the entries in the index files completely (Figure 2). This allows records to be added, deleted, or updated in the main file with a minimum of data movement. When a record is deleted, it is given a special key value that marks its position in the file as available, When a record is added to the

file, it can be stuck into the first free position in the file or added to the end of the file if no available slots are found. The program that manages the database can update the indexes each time it adds or changes a record, or it can process a batch of records and then rebuild all of the indexes simultaneously.

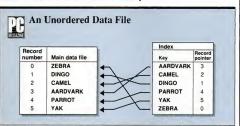


Figure 2: An unordered data file with its index file. Because the data in the main file never needs to be moved, this is more efficient than the scheme shown in Figure 1. This is the simplest type of index file, with entries of uniform length, organized sequentially in order of key value, and associating each key with a record number or position in the main file.

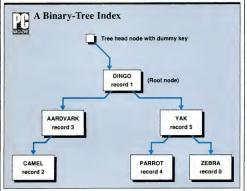


Figure 3: A binary-tree index. The "root" node of the index contains the key for the first record that was added to the data file. Its linkages point to two subtrees: one holds the index entries for all records with lesser keys and the other indexes the records with greater key.

ORGANIZING THE INDEX FILE

Now let's peek inside the index file itself. The simplest form of index is just an abstract of the main data file, that is, a sorted list of keys associated with record numbers (see Figure 2). We can search such an index file in the same ways we used for the nonindexed files in the last column: either sequentially until the desired key is matched or excluded or with a binary search (assuming the index-file entries have a constant length).

Regardless of the search method, one drawback of such simple index files is that the search time is strongly dependent both on the contents of the index file itself and on the value of the key of interest. For example, if a binary search is used and the key values are not evenly distributed, the number of index entries which must be inspected to match a specific key may vary widely. And in real life, key values are seldom evenly distributed. Customer last names tend to begin with A, B, C, D, H, M, S, and W rather than O and V, for example, and active account numbers tend to be heavily weighted toward the most-recently assigned number.

This is not a very desirable situation from the user's point of view. Naturally the user wants the search time for any given record to be as short as possible. But although he might not verbalize it, the user also wants search times to be uniform. He will get very aggravated if your program takes four times as long to find a name beginning with M as it does with a name beginning with B, ort—if you do manage to convince him to live with nonuniform search times—if the search times don't vary in a "predictable" way.

Using a sequential or binary search of an index also complicates life when there can be multiple records with the same key value. In the case of the sequential search, after finding a match, you must keep reading index entries until you've found a mismatch. With the binary search, you may have to scan the index file for a mismatch in both directions from your original match to identify all the candidate records. This is worse than inelegant; it's inefficient, since you will always be obliged to inspect index records that are not matches.

Yet another drawback of such simple indexes is the amount of data movement



ZENITH INNOVATES AGAIN

Today's leader in battery-powered portables gives you the first 386 laptop with all the options you asked for.

It's here. TurbosPort 386. Created for one simple reason: You asked for it. Another Zenith Data Systems innovation for the way you work every day.

The lightweight TurbosPort 386 is a technological first loaded with one breakthrough after another. Like our *Page White* display, which virtually duplicates printed-page clarity. With sharp black images on a fluorescent backlit screen. And for ultimate speed, we've innovated far beyond our competition. To maximize your *Windows*-based applications in or out of the office.

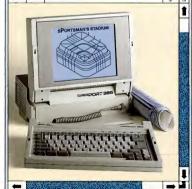
TurbosPort is also the first 386 laptop to ride on Zenith's Intelligent Power Management System." It gives you control of battery usage, so you'll always have the 386 performance you need. With no plugs. No cords to tie you down. You even get the desktop

comfort of a detachable keyboard.

Now you no longer have to trade power for portability. And the proof is in the innovation. The Zenith Data Systems TurbosPort 386. The only portable to give you all the options of 386 desktop performance. In the office. Or anywhere.

For the name of your nearest

For the name of your nearest Zenith Data Systems authorized dealer, call 1-800-553-0559.





THE QUALITY GOES IN BEFORE THE NAME GOES ON®

Graphics simulate Microsoft* Windows, a product of Microsoft Corporation. Microsoft* Windows is included with all hard disk models of Zenith Data Systems' advanced desktop systems.



WordPerfect Office gives your network the power of positive linking.

Your PC network can greatly improve group productivity and organization – if you give it the power to do so.

WordPerfect Office can supply that power. Its Electronic Mail feature lets network users exchange files, memos and phone messages. And it employs password protection and other security mechanisms to ensure that your communications remain confidential.

WordPerfect Office's unique Scheduler enables anyone on the network to set up internal meetings, reserve conference rooms, or do both simply by keying in the appropriate information and letting the program go to work.

WordPerfect Office also integrates application software on a flexible "shell" menu, giving you one-keystroke access to any program, and letting you exchange data between compatible programs in a matter of seconds.

And WordPerfect Office features a Notebook pro-

gram that makes it easy to create, organize and call up frequentlyused data records. Office also provides network users with a calendar, file manager, macro editor, program editor and calculator.

Like any WordPerfect* product, WordPerfect Office has a familiar, intuitive look and feel. It can maximize the powers of communication – of your network and the people who use it. So check out what our Office can do for your office.

For more information write to WordPerfect Corp., 1555 North Technology Way, Orem, Utah, 84057 Or call (801)225-5000. (In Canada, call 1-800-267-2499.)



WordPerfect

■ POWER PROGRAMMING

involved in adding or deleting an index entry. Of course, it's much less work than moving the actual records around in the main file. Still, we'd like to reduce further-better vet, eliminate-the need for data movement altogether.

Over the years, the gods of computer science have come up with multiple answers to these problems. One of the mostcommonly used solutions is to structure the index as a binary tree. In such a scheme, each entry in the index file is a node in the tree. The node consists of a key value, a record pointer into the main file. and a linkage to a "left" and "right" subtree (which might be a null link, if that subtree is empty). The first entry in the index file is the root of the binary tree: its "left" link points to the subtree containing all nodes with lesser keys, and the "right" link points to the subtree holding all nodes with greater keys.

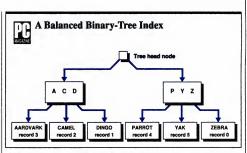


Figure 4: A balanced binary-tree index, Although similar to the index in Figure 3, this tree contains two kinds of nodes; internal nodes, which only point to other nodes, and external nodes, which point to actual data records. In a balanced tree, the number of nodes that must be examined to find any particular index entry is a constant.

```
MAKRIKF.C Creates an indexed random access file for use by IRCHIKF.C Copyright (6) 1389 51ff Communications Co. PC Magasine * Ray Duncan
        The user is prompted to soter from eare to one hundred ASCII strings. These strings are used to build record in the main date file TERTILE.ANT end two index files to the index files the strings of the strings and record numbers, and TERTILE.IEZ, which is a binary tree index.
                                                                                                                                                                                  int ontkeys(woid)
                                                                                                                                                                                          int 1. 1:
                                                                                                                                                                                          1 - 6.
        Each record in TESTFILE.DAT is RSISE bytes long. The format of the index files is defined by the constant RSISE and by the structures 'index' and 'index2'. All these manifest constants and structures must be kept synchroniesed with SRCHIF.C.
                                                                                                                                                                                          while(i < N_ITEMS)
                                                                                                                                                                                                  printf("$2d: ", i+1);
cete(4iteme(ISISE * i));
                                                                                                                                                                                                   for(1 = 0; 1 < 1; 1++)
                                                                                     /* max entry length */
/* max number of strings */
/* fixed record size */
/* maximum key length */
                                                                                                                                                                                          return (i))
 char items[N_ITEMS * ISISE];
                                                                                     /* original entries stored bere */
struct indes! {
    char key(KSIEE);
    ist recno;
    } index![N_ITEMS] )
                                                                                     /* sorted sequential index */
                                                                                                                                                                                  void writedate(rece)
  int i = E;
int fh;
char recbuf[REISE];
                                                                                     /* bicary tree index */
        int recno;
int left;
int right;
} indes2(x_ITEMS + 1);
int getheys(void);
void writedata(int);
void writeindex1(int);
void writeindex2(int);
void treeinsert(iot, int);
void dumptree(iot);
                                                                                                                                                                                          if(fb -- -1)
                                                                                     /* fonction prototypes */
main()
                                                                                                                                                                                           while(i < recs)
         int i;
                                                                                     /* number of record keys entered */
```

```
Get record keys from user, leave them in erray 'items', return number of keys to celler.
                                         /* scratch variables */
puts: "\nEnter keys for file records...");
                                         /* initialise string count */
                                         /* enforce maximum entries */
                                         /* prompt user for next string */
/* read keyboard, store in array
    /* lest entry if empty line */
                                         /* make sure not duplicate key */
        if(strocmp(sitems(ISIEE * i), sitems(ISIEE * j), RSIEE; -- 8)
break: /* exit loop if duplicate found */
    /* return no. of keys entered */
Creete main data file TESTFILE.DAT, using strings stored in array 'items'.
/* create main data file */
fh = open("TESTFILE.DAT", o_WHOSEY|o_CREAT|o_TRUNC|o_BIRARY, s_INRITE);
                                         /* terminate if orests failed */
    puts("\nCan't creete TESTFILE.DAT.");
exit(1);
puts("\nWriting TESTFILE.DAT...");
                                         /* build and write records */
    memoet(recbuf, 0, RSIZE);
strncpy(recbuf, &items(ISIZE * i), RSIZE);
write(fh, recbuf, RSIZE);
i++;
```

Figure 5: MAKEIXF.C, a "test-bed" C program for creating an indexed data file based on ASCII keys entered by the user. The resulting files, named TESTFILE.DAT, TESTFILE.IXI, and TESTFILE.IX2, are used by the SRCHIXF program shown in Figure 6.

■ POWER PROGRAMMING

```
close (fh);
                                                                                                 /s release file bandle s/
                                                                                                                                                                                                                                                                                                          /s terminate if greate failed s/
                                                                                                                                                                                                                    if(fh == -1)
                                                                                                                                                                                                                            pute(".nCan't creete TESTFILE.[E2.");
exit(1);
         Create sequential index file TESTFILE.III, using strings stored in array 'items'. The index is first built in the structure 'index' by copying each key to the structure associating it with a record number. The index is then sorted and written to disk.
                                                                                                                                                                                                                   pute: "\nWriting TESTFILE.IE2..."):
                                                                                                                                                                                                                   void writeindex1(recs)
                                                                                                                                                                                                                    close(fh);
                                                                                                                                                                                                                                                                                                         /* release bendle */
         int 1 = 0;
                                                                                             /* scretch veriable */
/* hendle for indea file */
                                                                                             /* build index entries */
                                                                                                                                                                                                                    Add a new node to the binary tree. Procedure is called with an indea to array 'items' (used to locate the key for the node being added end as the record number for TESTFILE.DAT) and the number of the next free node.
         while(1 < recs)
                  strncpy(indeal[i].key, &items[ISIZE * i], RSIZE);
index1[i].recno = 1;
                                                                                                                                                                                                           void treeinsert(itemmo, new)
         /* sort the index */
if(recs := 0) qsort(sindex1[0], recs, siseof(index1[0]), stromp);
                                                                                                                                                                                                                    int i, j, node • #:
         /* create sequential indea file */
fh * open("TESTFILE.IEL", o_WRONLY|o_CREAT|o_TRUNC|o_SINARY, S_IMEITE);
                                                                                                                                                                                                                                                                                                          /* find tree insertion point */
                                                                                                                                                                                                                           /* to choose oubtree, compare this if(() = atroop(ditems()tems() tems() 
         1f(ih == -1)
                                                                                              /* terminate if creete failed */
                  puts("\nCan't create TESTFILE.IE1,");
eait(1);
         puts(":nWriting TESTFILE.IE1...");
                                                                                                                                                                                                                   ) while (node Je -1):
                                                                                                                                                                                                                                                                                                          /* ontil empty subtree found */
         /* release handle */
                                                                                                                                                                                                                    if(j < 0) lndex2[i].left = new;
else indea2[i].right = new;</pre>
                                                                                                                                                                                                                                                                                                   /* update parent node link field */
         Create binary tree indea file TESTFILE.IX2, using strings
stored in array 'items'. The keys are added into the tree
in the order of their original entry, and are associated
with a record number. The index is then written to disk.
                                                                                                                                                                                                          /•
                                                                                                                                                                                                                    Debugging routine to dump binary tree nodes in order of keys. This is just to demonstrate that we are writing a valid and correctly ordered tree and that there are no wild link fields.
void writeindex2(recs)
          int i = 0;
                                                                                               /* scratch variable */
/* handle for indea file */
         /* ignore empty subtrees */
                                                                                                                                                                                                                           dumptree(indea2(node(.left); /* display left subtree */
                                                                                                                                                                                                                               if(node == 8) printf("\nContents of binary tree lndea:");
slse printf("\nNode = %2d, Becord no. = %2d, Record key = %.8s",
mode, index2(node).recno, index2(node).rev();
                                                                                               /* build binary tree */
                  treeinsert(i, i+1);
                                                                                               /* add new node for current string */
                                                                                                                                                                                                                           dumptres(index2(node),right); /* display right aubtres */
         ) /* create file to hold binary tree fh = open("TESTFILE.IE2", O_MEONLY|O_CREAT|O_TEUNC|O_SIMARY, S_IMPRITE:
                                                                                                                                                                                                                                                                                                                                                                        (Figure 5 ends)
```

```
int binsearch(int, cher *, int, int); /* function prototypes */
int seqsearch(int, char *);
int tressearch(int, char *);
                          SECHIEF.C Searches indexed datafile previously created by MAXEIEF.EXE. Copyright (C) 1969 Elff Communications Co. FC Nagazine * Ray Dunces
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              main()
                          The user is prompted to enter a search key. The first 8 cheracters of the key are used to search the sorted index file TESTILE.711 (using both sequential and binary search algorithms) and the binary tree index file TESTILE.121 (see found, the corresponding enterties the search of contents from TESTILE.122 for set significant search of the testing the search of the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 int i;
int fhdf, fhixl, fhix2;
long faise;
int frece;
char key[80];
char rec[RSIZE];
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /* scratch variable */
/* file handles */
/* size of file in bytes */
/* number of records in file */
/* key entered by user */
/* scratch record buffer */
                          Each record in TESTFILE.DAT is MSIZE bytes long. The format of the indea files is defined by the constant MSIZE and by the structures 'indea'. All these sanifest constant and structures meet be kept synchronized with MAXIETY.C.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      if((fhdf -- -1) || (fhis1 -- -1) || (fhis2 -- -1)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         puts(*\nMissing data or index file.*()
     #include <atdio.h>
#include <atdio.h>
#include <atdib.b>
#include <fcntl.h-
#include <fcntl.h-
#include <ays\types.h>
#include <ays\
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    fsize = lseek(fhdf, SL, SEEE_ENO); /* find file size */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    frece - faire / RAIRE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /* calculate number of records */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    printf("\nTESTFILE.OAT contains %ld bytes, %d records.", fsize, frecs);
  #define RRISE 64
#define KRISE #
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         printf("\n\nEnter key: ");
gets(key);
                                                                                                                                                                                                                                  /* index entries inspected counter */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /* terminate if empty line */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         if(key(0) -- 0) breek;
  /* sorted sequential indea */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      if(strlen(key) > KSISE)
  printf(*\mmarsing: key truncated to %d characters.*, KSISE);
/* binary tree indea */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                /* reset index entries counter */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (continues)
```

Figure 6: SRCHIXF.C, a C program that performs sequential, binary, and binary-tree searches on the indexed data file created by MAKEIXF.

IF YOU LIKED OUR AD. YOU'LL LOVE THE BOOK.

n the back cover of this magazine, you'll find a 4-page ad about our 386™ systems, 286 systems, laser printers, and low

direct-from-the-manufacturer prices. And if you

like what you see, we have a 28page catalog you'll like even more. Just send the card below, and we'll send you a free copy.

> Or call (800) 426-5150. In Canada, call (800) 387-5752.

© 1988 DELL COMPUTER CORPORATION. 386 is a trademark of Intel Corporation

GET OUR FREE 28-PAGE CATALOG OF DELL COMPUTER SYSTEMS.

This new catalog is the best place to shop for high performance 386 and 286 systems. We also offer a full line of software, peripherals, enhancement products, and networking solutions. Just send this card, and we'll send you a copy.

Name:			
Title:			
Company:			
Address:			
City:	State:	Zip:	

□Please have a Dell representative call me.

- 1. Are you a (select one): A □ End user
- B Consultant
- C Reseller D ☐ Corporate Purchaser C ☐ Over 21
- E □ DP/MIS Manager 2. Which products are
- you most interested in? A 286 architecture
- B □ 386 architecture 3. Are you interested in
- computer products for: A D Home
- B Business

- 4. How many PCs do you have installed now?
- A | 1-10
- B 🗆 11-20
- 5. How many PCs do you (your company) plan to purchase in the next twelve months?
- A 🗆 1-10 B 🗆 11-20
- C Over 21
- 6. Is your requirement: A | Immediate
- B 1-3 Months C Over 3 Months
- D Info only ADCODE 51B32

GET OUR FREE 28-PAGE CATALOG OF DELL COMPUTER SYSTEMS.

This new catalog is the best place to shop for high performance 386 and 286 systems. We also offer a full line of software, peripherals, enhancement products, and networking solutions. Just send this card, and we'll send you a copy.

Name:		
Title:		
Company:		
Address:		
0.		

☐ Please have a Dell representative call me.

- 1. Are you a (select one): A

 End user
- have installed now? B Consultant A 1-10 B 🗆 11-20
- C
 Reseller D Corporate Purchaser
- E □ DP/MIS Manager
- 2. Which products are you most interested in? A 286 architecture
- B □ 386 architecture 3. Are you interested in
- A THome
- computer products for:
- B Business
- C C Over 21 5. How many PCs do you (your company) plan to purchase

4. How many PCs do you

- in the next twelve months? A 🗆 1-10 B 🗆 11-20
- C Over 21
- 6. Is your requirement: A | Immediate
- B 1-3 Months C Over 3 Months D Info only
- ADCODE 51B32

In the back cover of this magazine, there's a 4-page ad for Dell Computer Systems. It invites

you to call our toll-free

number, so you can get

DELL COMPUTER CORPORATION

9505 Arboretum Boulevard

Dept. ME

Austin, Texas 78759-9969

OSTAGE WILL BE PAID BY THE ADDRESSEE

fine with us. Just fill it out,

and we'll get a catalog to you right away.

our free 28-page catalog. But if you'd rather send this card, that's

IN THE UNITED STATES NO POSTAGE NECESSARY IF MAILED



AUSTIN, TEXAS

PERMIT NO. 6745

FIRST CLASS MAIL

BUSINESS REPLY MAIL

UNITED STATES NO POSTAGE NECESSARY IF MAILED IN THE





AUSTIN, TEXAS **BUSINESS REPLY MAIL** PERMIT NO. 6745 **FIRST CLASS MAIL**

OSTAGE WILL BE PAID BY THE ADDRESSEE

DELL COMPUTER CORPORATION 9505 Arboretum Boulevard Austin, Texas 78759-9969 Dept. ME

■ POWER PROGRAMMING

```
printf("\nsaquantial search result: ");
if((i = seqsearch(fbix1, key)) == -1) printf("record not found,");
else printf("record number is td,", i);
printf(" td index entries iespected.", inspected);
                                                                            /* raset index antrias countar */
                                                                            /* perform binary search of
TESTFILE.IX1, display results */
              printf("\nsinary search result: ");
if((1 = hineaarch fhixt, kay, 0, frece-1)) == -1)
printf("record not found,");
else printf("record number is bd,", i);
printf(" d index entries imported,", inspected);
                                                                            /* raset index antrias counter */
               inspected o 8:
                                                                           /* perform binary tree search of
TESTFILE.IX2, display results */
               printf(*\nBinsry tree rasult:
    if((i = trassacrch(fhix2, key)) == -1) printf(*record not found,*);
also printf(*record number is td,", i);
printf(* td index antise imspected.*, inspected);
                     i |= -1) /* fetch record from main date */
lessk(fhdf, {long) (i * Ruses) (EEE/EET)
read(fhdf, rec, Mains))
restrict("Normates of record bld: %s*, i, sec!)
                                                                           /* ralease file handles */
/+
        Search indee file TESTFILE.IX1 sequentially to match the 
specified key. Called with a file bandle and key address. 
Returns the record number for TESTFILE.DAT if match found, 
or -1 to indicate no match.
int sequearch(int fh, char *kptr)
        int i;
struct index1 index1;
                                                                           /* scratch variable */
/* recaives index file data */
        leeck(fh, SL, SEEK_SET);
                                                                           /* rewind to start of file */
        /* do until and of file found */
while(reed(fh, (char *) &index1, sizeof(index1)) != 6)
        inspected++; /* ir
i = strncmp(kptr, indeel.key, KSIIE);
                                                                     /* inspect indee entry */
        1 fel -- 41
                                                                   /* if matched, return record no. */
       if(i == 0)
    return(indeel.recno);
elem if(i < 0) breek;</pre>
                                                                   /* if record absent, end saerch */
                                                                     /* no match, return -1 */
```

```
Sinary search of TESTFILE.1S1 to match the specified key. Celled with a file handle, key address, and the first end lest record numbers of the index file segment being inspected. Neturns the record number for TESTFILE.DAT if match found, or -1 to indicate no match.
int hinsearch(int fh, char *kptr, int left, int right)
     int i, j;
struct _index1 index1;
                                                           /* scretch variables */
/* receives index file data */
     if(laft > right) return(-1);
                                                          /s and march if record shoot s/
     1 = 12eft a minht: / 2-
                                                          (a calculate record number of
      if(1 am 6) return(index) recons: /s if matched, raturn record no. s/
                                                          /* otherwise bisect file, recurse
to inspect maxt record */
     if() < 0) binsearch(fh, kptr, left, i-1);
else hinsearch(fh, kptr, i+1, right);
     Sinary trea search of TESTFILE.182 to match the specified
key. Cellad with e file handle and key address. Returns
the record number for TESTFILE.DAY if match found,
or -1 to indicate no match.
int trassearch(int fh, char *kptr)
     int i;
int node = 0;
struct _indee2 index2;
                                                           /* scratch variable */
/* current node being inspected */
/* receives index file data */
     while(node := -1)
                                                           /* do until match or empty subtree */
           /* if matched, raturn record no. */
           if(i < 0)

node = index2.laft;

alsa node = index2.right;
                                                           /* eles traveres tree */
     retern(-1);
                                                           /s no match, return -1 s/
                                                                                                (Figure 6 ends)
```

To find a particular key, the binary tree is traversed from the root, as shown in Figure 3. At each node the key is compared. If it doesn't match the node exactly, then—based on the result of the comparison—one branch or the other of the node's subtree is selected. This process, which is admirably suited to languages that support recursion, is continued until the key is matched or until an empty subtree is reached.

In such a binary-tree index, the physical order of the entries in the index file is irrel-evant and the index is easy to update dynamically. When a new record is added to the main data file, a corresponding index node can be physically added at the end of the index file, after which its linkage fields and those of the node that will become its "parent" are updated. Very little work and almost no data movement are required. Similarly, nodes can be logically deleted from the tree merely by adjusting some linkages.

Simple binary trees can lead to difficul-

ties, however. When keys are not well distributed or are added to the tree in a nonrandom fashion, the tree can become quite assymetrical. As with the binary search

■ In a binary-tree index, the physical order of the entries in the index file is irrelevant and the index is easy to update dynamically.

we've already discussed, this leads to wide variations in tree traversal times. The computer scientists' answer to this is the "balanced" tree (sometimes called a *B-tree*), in which all subtrees of the nodes at a particular tree level have the same length.
Such a tree is shown in Figure 4.

Balanced-tree indexes are implemented with two types of nodes rather than one. Internal nodes point only to other nodes, and external nodes point to the records actually being indexed. Internal nodes must be able to contain more than one key, and they can have multiple linkages to the next-lower level. Balanced trees are very widely used because of their excellent performance on worst-case key distributions. The creation and maintenance of balanced trees is a complex subject and far beyond the scope of this column, although we may return to it in a later installment. In the meantime, let me refer you to Chapters 15 and 18 of Robert Sedgewick's Algorithms for further details.

INDEXED FILE TEST-BEDS The two programs that accompany this column are test-beds that let you build small indexed files and then search them by several different methods.

TOSHIBA

TOSHIBA is the world's number one name in LAP TOP Computers and 24-Pin Printers. And SEFCO is fast becoming known for its low pricing, service, and availability on fine Toshiba products.

SEFCO COMPUTER PRODUCTS

America's -1 Source for LAP TOP Computers and 24-Pin Printers



- PRICING
- SERVICE
- AVAILABILITY

1(800)777-1288

Please call — We look forward to hearing from you.

Convenient Location's Nationwide



SEFCO SUCCESS BY DESIGN

CIRCLE 222 ON READER SERVICE CARD

FOR RETAILERS ONLY

BECAUSE YOU SELL ONE OF THESE...



YOU SHOULD SELL THIS...

Bring PC MAGAZINE, the "silent salesman," into your store and provide your customers with clearly written comparative reviews of the hardware and soft-ware you carry!

Knowledgeable PC users turn to PC MAGAZINE 22 times a year for in-depth evaluations conducted by PC Labs,



our independent product testing laboratory.

Increase the sales of your inventory
and earn additional profits with PC
MAGAZINE. For more information on
how you can sell the profit leader, call
(212) 503-5331 or write:
Chris Chery—Retail Sales

Chris Cherry—Hetail Sales
Representative
Ziff-Davis Publishing Company
One Park Avenue
New York, NY 10016

PRODUCTIVITY

■ POWER PROGRAMMING

The first program, MAKEIXF. C (Figure 5), prompts you for up to 100 short AS-CII strings. When you press Enter alone in response to a prompt, it creates a main data file named TESTFILE. DAT. The program then sorts the strings and creates two index files: TESTFILE.XI and TESTFILE.IX. The main data file is arranged in the order that you entered the strings, so you can set up various worst-case situations. The first index file is a simple sorted list of keys and record numbers; the second is implemented as a binary tree.

The second program, SRCHIXF.C, is

Both MAKEIXF.C and SRCHIXF.C can be used in MS-DOS or OS/2 without any changes.

listed in Figure 6. It opens TESTFILE .DAT, TESTFILE.IX1, and TEST-FILE.IX2, and prompts you for a key to search for. It then searches both index files and reports whether the record exists. If it does, SRCHIXF.C tells you how many keys had to be inspected by the sequential search, binary search, and tree search methods to find it.

Both programs can be used under either MS-DOS or OS/2 without any changes. To compile the two programs, enter the commands

CL MAKEIXF.C CL SRCHIXF.C

Run MAKEIXF.EXE first to create a data file, then run SRCHIXF.EXE to experiment with it. You are able to terminate SRCHIXF.EXE at any time by pressing Enter alone, Ctrl-C, or Ctrl-Break in response to a prompt.

THE IN-BOX

Please send your questions, suggestions, and comments to me at any of the following e-mail addresses: PC MagNet: 72241,52

MCI Mail: lmi BIX: rduncan

P

USSMSG10: MAINFRAME 0013: Enter Application

E-Mail

USSMSG2: R70302 E-MAIL COMMAND UNRECOGNIZED

E-Mail PLEASE!

USSMSG2: R70302 E-MAIL COMMAND UNRECOGNIZED

E-Mail PRETTY PLEASE!!

ì

Why can't mainframes speak English?

You have to wonder why the people who design big computers make it so difficult for normal human beings to use them.

Particularly non-technical, hastily trained human beings, who need to talk to the mainframe from their PCs.

It's been a serious dilemma. Until NOW!

NOW! is a menu-making, macro-writing tool that automates the drudge work of PC-to-host communication.

When someone wants to review their E-Mail, for instance, all they need do is make one menu selection.

NOW! then takes on the tedious job of loading the 3270 software, log-

NOW! PC/HOST AUTOWARE"

Attachmate 1-800-426-6283

17-OCC-7420-O203

IN WASHINGTON STATE 206-644-4010.

N.78" and Aunware are trademarks of Attachmate Corp. Bellevue, W.

IBM as reprored trademark of internate or Bastrow Machine Corporation

CIRCLE 124 ON READER SERVICE CARD.

ging onto the mainframe, and wading through the passwords and commands to arrive at the E-Mail screen.

It's not hard to see how NOW! reduces wasted time, needless stress and training costs.

Nor is it difficult to find out more. Simply call or write and we'll send you a free demo disk and detailed information.

All of which, you'll be pleased to hear, is written in a language called English.

INTRODUCING THE 386 PERFORMANCE SERIES-COMPUTERS THAT GIVE YOU FULL POTENTIAL

FIVESTAR 386s HAVE THE **POWER AND FLEXIBILITY** TO BE USED AS POWERFUL FILESERVERS. FULLY COMPATIBLE WORKSTATIONS, OR TOTAL DESKTOP SOLUTIONS.

Easy to use in NOVELL and 3-COM networks, Supports MS-DOS, MS OS/2, Unix and Xenix operating systems.



Model 325

- INTEL 32-bit 80386 Processor running at 25/6MHz user selectable. zero wait states
- 1MB RAM expandable to 32MB 32-bit Memory
- 80387 and Weitek 3167 support LANDMARK 41.5MHz Rating
- MIPS 5.84 Rating
- 128KB cache memory
- . SLOTS: one 8-bit: four 16-bit: three 32-bit (one dedicated for memory)
- Serial/Parailel/Game Ports
- 1.2MB or 1.44MB Floppy Drive
- 101-key Enhanced Keyboard
- 16-bit VGA Video Card 1:1 Interleave Hard Disk Controller

\$3.895

Model 320

- INTEL 32-bit 80386 Processor running at 20/8MHz user selectable.
- zero wait states 1MB RAM expandable to 16MB
- 32-bit Memory 80387/20 Coprocessor support
- LANDMARK 30.0MHz Rating
- · MIPS 4.33 Rating 64KB cache memory
- SLOTS: one 8-bit: six 16-bit: one
- Serial/Parallel/Game Ports
- . 1.2MB or 1.44MB Floopy Drive
- 101-key Enhanced Keyboard 16-bit VGA Video Card
- 1:1 Interieave Hard Disk Controller

\$2.795

All prices and specifications are subject to change without notice. FIVESTAR, Intel, Novell, 3-COM, Unix, Xenix, MS-DOS and MS-OS/2 are registered trademarks

Model 316

- INTEL 32-bit 80386 Processor running at 16/8MHz user selectable, zero walt states
- 1MB RAM expandable to 16MB
- 32-bit Memory
- 80387/16 Coprocessor support
 LANDMARK 24.0MHz Rating
- · MIPS 3.43 Rating
- 64KB cache memory . SLOTS: one 8-bit: six 16-bit: one
- 32-bit
- Seriai/Parallel/Game Ports
- 1.2MB or 1.44MB Floppy Drive 101-key Enhanced Keyboard
- 16-bit VGA Video Card

• 1:1 Interleave Hard Disk Controller \$2,195

- Model 316SX INTEL 80386 Processor running at
- 16MHz, zero wait states 1MB RAM
- 80387SX Coprocessor support
- LANDMARK 19.0MHz Rating
- . SLOTS: two 8-bit; six 16-bit · Serial/Parailel/Game Ports
- . 1.2MB or 1.44MB Floppy Drive · 101-key Enhanced Keyboard
 - \$1.495



These Performance Pluses are included* on FIVESTAR 386s!

- High-speed 16-bit VGA Video Card (Up to 300% faster screen update)
- Hard Disk Controller using 1:1 Interleave (Up to 300% faster transfer time)

*Optional on Model 316SX

On-Site Service Included!

 FIVESTAR Computers include 1 Year of On-site Service, Service Centers nationwide!

Complete Satisfaction Guaranteed!

 FIVESTAR Computers come with a 30 Day Money Back Guarantee and One Year Limited Warranty on parts and labor. Call for details

CIRCLE 319 ON READER SERVICE CARD

FIVESTAR CORPORATION

To order, call: 800-752-5555

Customer Support: 800-882-4950

1621 W. Crosby Road, Carrollton, Texas 75006

SPREADSHEET CLINIC



Printing the current time in the header or footer of a 1-2-3 worksheet; entering values as unattached text in Excel can cause a problem; calculating time in a SuperCalc worksheet.

Adding hours, minutes, and seconds in a SuperCalc worksheet

I have found that I need to calculate the total of the hour, minute, and second entries in my SuperCalc 4 worksheets. A simplified version of one of my worksheets is shown in Figure 1.

Cells B4:B8 contain values that represent whole numbers of hours; cells C4:C8 contain values that represent whole numbers of minutes; and cells D4:D8 have values that represent whole numbers of seconds.

To sum these values, I've used the formulas

in cells B10, C10, and D10, respectively. The formula in cell D10 calculates the number of seconds, above and beyond the number of whole minutes, represented by the sum of the second values in cells D4:D8. For example, the sum of the values in cells D4:D8 is 143. Since 143 seconds is 2 minutes and 23 seconds, this formula returns the value 23.

The formula in cell C10 calculates the number of minutes, above and beyond the number of whole hours, represented by the sum of the minute entries in cells C4:C8 plus the minute component of the sum of the second entries in cells D4:D8. In this case, the sum of entries in cells C4:C8 is 162; the minute component of the sum of the second entries in cells D4:D8 is 2. Since 162 plus 2 equals 164, and 164 min-

utes is equal to 2 hours and 44 minutes, the function in cell C10 returns the value 44.

In cell B10, the formula calculates the number of hours, above and beyond the number of whole minutes, represented by the sum of the hour entries in cells B4:B8 and the hour component of the sum of the minute entries in cells C4:C8 (including the minute component of the sum of the

second values in cells D4:D8). Here, the sum of entries in cells B4:B8 is 97; the hour component of the sum of the minute entries in cells C4:C8 (including the minute component of the sum of the second values in cells D4:D8) is 2. Since 97 plus 2 equals 99, the function in cell B10 returns the value 99 .- Joseph Gonzalez: San Juan. Puerto Rico

1	1	A	В	С	D	E	_
1							
2			Hours	Minutes	Seconds		
3							
4	Task	1	15	21	50		
5	Task	2	14	17	11		
6	Task	3	- 7	59	21		
7			22	42	18		
8	Task	5	39	23	43		
9							
10			99	44	23		
11							
	6 7 8 9	1 2 3 4 Task 5 Task 6 Task 7 Task 8 Task 9	6 Task 3 7 Task 4 8 Task 5	1 Hours 3 Hours 4 Task 1 15 5 Task 2 14 6 Task 3 7 7 Task 4 22 8 Task 5 39 9	1 Hours Minutes 3 4 Task 1 15 21 5 Task 2 14 17 6 Task 3 7 59 7 Task 4 22 42 8 Task 5 39 23	1 Hours Minutes Seconds 3 Task 1 15 21 58 5 Task 2 14 17 11 6 Task 3 7 59 21 7 Task 4 22 42 18 8 Task 5 39 23 43	1 Hours Minutes Seconds 3 4 Task 1 15 21 58 5 Task 2 14 17 11 6 Task 3 7 59 21 7 Task 4 22 42 18 8 Task 5 39 23 43

Figure 1: The formulas in cells B10, C10, and D10 of this worksheet calculate the total of the hour, minute, and second entries in cells B4 to D8.

	1	٨,	В	С	D	E	F
2			Days	Hours	Minutes	Seconds	
3							
4	Task	1	1	15	21	50	
5	Task	2	2	14	17	11	
6	Task	3	. 3	7	59	21	
7	Task	4	4	22	42	18	
8	Task	5	5	39	23	43	
9							
10			.19	3	44	23	
11	N.			-			

Figure 2: The formulas in cells B10, C10, D10, and E10 of this worksheet calculate the sum of the days, hours, minutes, and seconds in cells B4 to E8.

■ SPREADSHEET CLINIC

The technique described above will work in any spreadsheet program. If you want to, you can extend this technique to calculate days as well, as shown in Figure 2.

The formula in cell B10

SUM(B4:B8)+INT((SUM(C4:C8)+ INT((SUM(D4:D8)+INT(SUM (E4:E8)/60))/60))/24)

calculates the number of whole days: the formula

C18: MOD(SUM(C4:C8)+INT((SUM(D4:D8)+ INT(SUM(E4:E8)/68))/68),24)

in cell C10 calculates the number of whole hours; and the formulas

D18: MOD(SUM(D4:D8)+INT(SUM(E4:E8)/60,60) E18: MOD(SUM(E4:E8),68)

in cells D10 and E10 of the worksheet, calculate the number of whole minutes and seconds, respectively.

Excel modifies certain values entered in a chart as unattached text

I recently encountered a problem while 1 was adding unattached text to a chart that was created using the Excel program. When I entered the value 40,000 as unattached text for a chart, Excel converted that value into the string ="-25536". Figure 3 below shows the result.

Experimenting further, I discovered that this problem occurs with any value between 32,768 and 65,535, inclusive. Specifically, Excel subtracts values in this range from 65,536, multiplies the difference by -1, and displays the result in the chart.

Fortunately, you can circumvent this bug by entering the value in text form. For example, to display the characters 40,000 as unattached text, type = "40000". Then press the Enter key and Excel will convert the entry to 40,000, displaying this value in the chart .- Jaime Castro; Atlanta, Georgia

Apparently, Excel is storing values that are between 32,768 (32K) and 65,535 (one less than 64K) in short integer (16-bit) form, rather than in long integer (32-bit) form, as it should. Since the 16th bit in a 16-bit signed integer controls the sign of the value, the value 32,768 becomes -32,768; the value 32,769 becomes -32,767; the value 32,770 becomes -32.766: and so forth. Excel correctly stores values of 64K and greater in long integer form. Microsoft has corrected this problem in Version 2.1 of Excel.

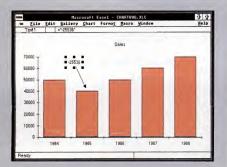


Figure 3: If you enter a value between 32,768 and 65,535 as unattached text in a chart, Excel will subtract it from 65,536 and multiply the result by -1.

How to print the current time at the top or bottom of 1-2-3 worksheets

The Lotus 1-2-3 program lets you use the @ symbol to insert the current date into the header or footer of a printed worksheet. However, 1-2-3- fails to provide a symbol that inserts the current time into either of these structures. To put the current time into the header of a document, I have come up with the macro shown in Figure 4. You can easily modify this macro so that it inserts the current time into the footer as well

The first statement in this macro enters the serial value of the current time into the cell named TIME (B7). Since this cell is assigned the Time 2 format, 1-2-3 will display that entry in hh:mm AM/PM form. Next, the macro tells 1-2-3 to issue the /Print Printer Options Header command and erase the current header (if there is one). The macro will then type the characters @ | | .

The current header will not be erased if the area to the right of the "Enter Header Line:" prompt is blank. Instead, the {Esc} key will return 1-2-3 to the /Print Printer Options menu. However, typing a character-in this case the letter X-assures that this area won't be blank. The next three characters, @ | |, specify a header that has the current date at its left edge, nothing in the middle of the page, and, at least to this point, nothing at the right edge of the page.

Before 1-2-3 presses the Enter key to lock in this header, it will execute this statement

'{Contents NEXT, TIME}

This instructs 1-2-3 to place a copy of what appears in the cell named TIME into the cell named NEXT (B4). For example, suppose that TIME contains the serial time value .75000. Because of the Time 2 format, this value will be displayed as 06:00 PM in the worksheet. Since column B is nine characters wide, the {Contents} command will place the nine-character label '06:00 PM (note the single trailing space) into NEXT.

NEXT is the next cell in the macro, so 1-2-3 will now type the label that it just entered into NEXT. Since 1-2-3 has not vet

Connect to Geniec

PASSWORD: 1-800-843-4302

NETWORK STARTER KIT

IOVELL ELS 4 USER SOFTWARE 4 ARCNET CARDS, CABLING & PASSIVE HUB

STORAGE DIMENSION HD FOR LAN

ACCESS TIME 18MS/COMPSLIBEED/READY TO LISE

230MB SCSI DRIVE W/CONTROLLER \$1899

285MB SCSI DRIVE W/CONTROLLER

\$2499

NETWORK INTERFACE CARD

HARVEST ARCNET \$99

HARVEST ETHERNET \$159

TIARA ARCNET TIARA ETHERNET \$109 \$199

NOVELL ELS 8 USER SOFTWARE

\$879

HARD DISK FOR MAC SE/II

STORAGE DIM 90MB INT HARD DISK KIT FOR SE/II . . \$899 EVEREX 60 EXT TAPE BACKUP FOR MAC SE/II\$859 SEAGATE 277N SCSI(60MB) W/UNIMAC SOFTWARE . \$579





GENTECH 286-20 (SUPER VGA SYSTEM) \$2149

· 80286-20 Processor, 20MHZ, 0 Wait.state

- 1MB RAM expandable to 4MB RAM on Motherboard
- · 80287 Support, 40MB Hard Disk
- Shadow RAM & Shadow Bios EMS Support for Extended Memory
- · User Configurable Hard DRive Bios Table VGA Color Video Card, 14° Color Monitor

GENTECH 386-20 \$1899 . 80386-20 Processor, 20MHZ, 0 Wait state

- 1 MB RAM expandable to 4MB on Motherboard.
- Using 1 MB static column RAM, upto 12MB
- 80387-20 support, 21 on Norton's Benchmark
 Runs Novell, Xenix/Unix, CAD, O/S 2 . AWARD Bios, one 32BIT, five 16bit, two 8bit slots

GENTECH 286-20\$1199

- . 80286 Processor, 20MHZ Clock, 0 or 1 Wait State
- . 512K RAM exp. to 1 MB on Mainboard EMS 4.0 Driver, 80287-10 Support, Phoenix Bios
 Norton 23, Landmark 26.7 MHZ

GENTECH 286-12\$829

- . 80286 Processor, 12/6 MHZ Clock, 0 Wait state 512K RAM exp. to 16MB using 100ns 256K D RAM
 8 slots upgradable to 1MB on Motherboard
- . Standard bios built-in hard disk set up

GENTECH 286-10\$779 . 80286 Processor, 10/6MHZ Clock, 0 Wait state

512K RAM exp. to 16MB using 120ns 256K D RAM 8 slots, upgradable to 1MB on Motherboard · Standard bios, built-in hard disk set up

GENTECH Turbo XT-10 . \$479 Nec V-20 CPU processor, 10/4.77 MHZ switchable

- 512K RAM expandable to 640K on motherboard
 Rates 4.0 on Norton Scale
- One 360KB Floppy Drive, ser/par/clock
- 84 key Keyboard · CALL FOR OUR VIDEO OPTIONS:
- Monochrome, EGA and VGA

 CALL FOR HARD DISK OPTIONS:
- All our 286 and 386 systems include 1.44MB or 1.2MB floppy drive, dual floppy/hard drive controller, 200 Watt power supply Dual serial and parallel ports, and 101 key enhanced keyboard
 - . 1 YEAR WARRANTY: All Parts and Labor.

COMPUTERS ACT DECEADOU

AST RESEARCH
NEW!!! BRAVO 286 8MHZ W/O DR \$789
Premium 286, Mod 70 512K RAM, 10 MHZ \$1189
Premium 286, Mod 300 1MB RAM \$2759
Premium Workstation 103/105 \$Call
Premium 386/16 Mod 5 1MB RAM
COMPAQ COMPUTER
Deskpro Model 1 1 DR w/640KB
Deskpro 286 Mod 1 1 DR w/640KB \$1749
Deskpro 386/25 Mod 60
HEWLETT PACKARD
HP VECTRA CS Mod 10 CPU 8086 640KB \$799
HP VECTRA ES Mod10 CPU 80286 640KB \$1319
HP VECTRA ES/12 Mod 10 CPU 80286/12Mhz . \$1719
HP VECTRA QS/16 Mod10 CPU 80386/16Mhz \$2632
HP VECTRA RS/20C Mod100e 80386/20Mhz . \$4999
HP VECTRA RS/25C Mod 100e 80386/25Mhz . \$6789
ZENITH
Supersport w/2DR
Supersport w/20MB HD \$2299
Supersport 286 w/20MB HD \$3099

MATH CO-PROCESSORS (LOWEST PRICES!!)

NEW!! NEW!! 8038 8087-3/8087-2													
80287-6/80287-10													
80387-16/80387-20													
80387-25		٠										. \$5	19

LASER PRINTERS

HEWLETT PACKARD\$1799/2879 DeskJet/PaintJet \$690/1029 \$4199 QMS PS 810 . . . DOT MATRIX BROTHER ML1709/1724 \$379/650 CITIZEN 120D\$145 is \$Call FUJITSU DL3400 . \$579 NEC P2200/P5200/P5300 \$360/535/689

OKIDATA ML320/321 \$339/475

PANASONIC KXP-1191/1180/1124 \$LOWII

CUSTOMER SERVICE 401-732-5556 ORDER ONLY 800-843-4302

OKIDATA ML393/391

FAX NO. 401-732-5518

VISA, MC, COD, CORPORATE PO ACCEPTED 217 Broadway, Suite 615, NY, NY 10007

SCANNERS/DIGITIZERS

ST 2020 Scanner.																							
Scanjet Plus													٠								\$	11	2
GITECH SCANMA																							
Handheld Scanne																							
MMAGRAPHICS S	à	ın	ni	т	ıa	s	kı	el	lc	h	А	u	N	۱	18	1	12	2	ŝ	3	75	W	345
RTA IS/ONE 12X1																							

LO

211

KU

\$1899 DE HP

PLOTTERS	
HEWLETT PACKARD	
HP 7440A/7475A \$975/13	99
HP 7570A Draftpro plotter \$28	99
HP 7550A Plotter \$29	96
Draftpro DXL/EXL \$3699/48	99
HOUSTON INSTRUMENTS	
DMP-61/DMP-62	95
Calcomp 1023/1043GT	

MONITORS

KDS 14° Flat VGA Black & White Monitor \$129	j
NEC Multisync 2A	J
NEC Multisync Plus/XL\$899/2150	
IMTEC 14" EGA / VGA Monitor)

NETWORKING

3 COM Etherlink 3C501								. \$399
3 COM Compatible Ethernet								.\$259
25Ft. Arcnet or Ethernet Cable	١.							. \$20
50Ft. Arcnet or Ethernet Cable	١,	ı.	i		 ı.			\$30
Advanced Netware 286 V2.15								. \$Call
SFT Netware 286 V2.15								. SCall

International Inquiries Welcome

We handle all your paper work



3d 2% for COD. Minimum PO \$500, Prices subject to lange. Return authorization required for defective error authorization required for defective blect to 20% restocking charge.

Notice: Never Before in Computer History Has a Buying Opportunity Like This Been Offered...

Take Your Pick...

286/16MHz/2 MB RAM •• 286/20MHz/1 MB RAM

or 386/16MHz/1 MB RAM

A REAL 32-bit 386-NOT AN SX!

Same Price • Same Configuration

***2699**

All are COMPLETE SYSTEMS with 68MB. 28MS Drive 14" Graphics Monitor, OmniKey and MS-DOS 4.01

Look At All You Get!

Features Unmatched Anywhere...

- One or two Mbyte of RAM
- . 65Mbyte 28MS hard drive
- One 1.2Mbyte and 1.44Mbyte floppy drive
 - Two serial, one parallel port Full-size desktop case
- Famed OmniKey/102 keyboard (pick of the pros)
- 14" MonoGraphics flat screen amber or white monitor
- Performance-enhancing software
 MS-DOS 4.01/GWBasic (full manuals)
- One-year warranty with our unique overnight parts replacement policy* (freight paid by Northgate)

Por the second consecutive

Shoper, the readers of Computer Shopper, the world's largest computer magazine, voted Northgate Computers "Best Buy" of all products advertised in the magazine and "Best Buy" for its 80386 computer system.

Everyone loves our overnight replacement policy! Faster than third party service! If any field replaceable part in your system goes down and disables your computer, Northgate guarantees to ship the proper replacement part OVERNIGHT AT OUR FREIGHT EXPENSE. You get a brand new part - be it the largest and most expensive hard drive to the smallest part-and it's shipped to you BEFORE YOU RETURN THE OFFENDING PART! Check our competition. In most cases, they must get the part or the whole computer back before you get a replacement.

NEW! Northgate "Big N" Revolving Credit Card.

(Not a lease—you own it!)
No money down • 3 years + to pay •
Low monthly payments • Unlimited
funds available! Works just like your
VISA or MasterCard, Or ...

Lease it with Northgate...
Northgate has a flexible lease plan suited to your needs. With up to five years terms, if cash conservation is your concern, ask about leasing your system with Northgate. PHONE NORTHGATE NOW...



S IOIE

The decision is up to YOU...

- Superb 80286/16MHz with 2MB of RAM
- **Blazing Fast New 286/20 System**
- True 32-Bit 80386/16 (Not an SX)

All three are complete systems configured alike at the same astonishing landmark price!

NORTHGATE'S 286/20 handles even large databases faster than other systems Infoworld (11/14/88) tested, including Dell. Plus it has a full size case and 1MB usable RAM. Doesn't waste 384K of RAM as many others do with shadowing methods.

OUR 286/16, with speed to spare, comes with a second Megabyte of RAM at no extra cost. Even with extra RAM it's hundreds below competition offers with the

same features. THE 386/16 blows right past 16-bit SX systems to true 32-bit 386 Computing Power. Imagine, a power computer with 68 MB of FAST hard drive storage at this incredibly low price! (And compare

prices with Compaq's SX.)
Which one is best for you? Either way you'll get Northgate's industryleading performance, quality,

If One of These is Not For You...Ask about Northgate's 286/12 that was awarded PC Magazine's "Editor's Choice" (1/31/89). Or Northgate's 386/20, top of the line!

workmanship and warranty. As with all Northgate systems these three feature 800,000 Bytes Per Second throughput—up to three times faster than Dell,

IBM. Compaq.
All systems give you 1MB RAM expandable to 16MB; Microscience's lightning quick 28MS hard disk with 68MB of storage and a 16-bit high speed RLL dual drive controller.

Add to these a host of extras only Northgate includes-BOTH 1.2 and 1.44 floppy drives; our exclusive Omnikey/102 keyboard; high resolution 14" flatscreen amber or white monitor and MS-DOS 4.01.
PLUS...Northgate makes

available a wide range of options. We'll build your Northgate Your Way and you will be amazed at our 'No Baloney" pricing.

Most vendors charge upwards of \$500.00 per megabyte. Add 3MB to the Northgate 386/16 for just 899900 NOTE: IMBchips — I or 4MB only can be inst motherboard. This price applies only to men with the 386/16 system.

SPECIAL BONUS MEMORY UPGRADE OFFER WHEN YOU BUY THE 386/16

HARD DRIVE OPTIONS-

Prices include Drive and RLL, ESDI or SCSI TOSYS SIZE TYPE 40Mbyte 108Mbyte 300.00 600.00 SCSI RLL

80Mbyte 130Mbyte 160Mbyte 300Mbyte SCSI \$ 700.00 \$1000.00 640Mbyte

VIDEO OPTIONS— Prices include Monitor and video card.

ADD SPEED TYPE

16-Bit VGA Mono
16-Bit VGA Color Analog
16-Bit VGA Color + SIZE TOSYS. 14 Inch 16-Bit 14 Inch 16-Bit \$325.00 14 Inch 16-Bit 14 Inch 16-Bit

NOTE: VGA Mono and Analog are 640 x 480 res VGA Color + is 800 x 800.



13895 Industrial Park Blvd., Suite 110, Plymouth, MN 55441 From Foreign Countries call: Corporate Headquarters (612) 553-0111 • FAX (612) 553-1695

Phone Now...Let Northgate begin building your computers...Today!

1-800-548-1993

Hours M-F 7am-8pm CST, Sat. 9am-3pm CST New Canadian Toll-Free Order Hotline 1-800-338-8383



TERMS: VISA, MC, COD, Credit Card, Pre-Payment (allow 2 weeks for personal checks to clear), Wire Transfer and Purchase Orders for Rated Accounts. We also ship to APO and FPO. All shipments are F.O.B. Minneapolis, MN.

For corporate, government and institutional sales in Texas, Louisiana and Oklahoma, call (512) 343-7591.

PROTECT **YOUR COPIES** OF PC MAGAZINE

Make your collection of PC Magazine a handsome addition to your office or home—and protect and organize your copies for easy reference!

PC Magazine Binders and Cases are made of durable, luxury-look leatherette over quality binder board. Custom designed for PC Magazine, every order receives FREE transfer foil to mark dates and volume numbers.

FOR FAST SERVICE CALL TOLL-FREE 1-800-972-5858

MAGAZINE BINDERS

Hold your issues on individual snap-on rods. \$9.95 each: 3 for



OPEN BACK CASES



PC MAGAZINE

i	499 East Erie Avenue - Pl	hiladelphia PA 19134
i	Please send 🗆 Binder	rs 🗆 Cases Quantity
i	Payment enclosed \$.* Add \$1 per case/ andling. (Outside USA, add \$2.5)
i	binder for postage & he per case/binder ordere	andling. (Outside USA, add \$2.5) id, US currency only.)
:	C	

Charge my:	☐ MC (Minimum order \$15.)
Card No	Exp. Date
Mr./Mrs./Ms	Please Front Full Name
Address	No PO Box Number Peose
City	
State	Zip
*PA residents add A	All soles toy

SPREADSHEET CLINIC

```
١t
              {Let TIME, @NOW-@INT(@NOW)}
2
              /ppohX{Esc}@|
              (Contents NEXT, TIME)
4
    NEXT
              {BS}~gagg
    TIME
```

Figure 4: This macro inserts the current time into the footer of a 1-2-3 worksheet.

```
1
    ۱t
              (Let TIME, @NOW-@INT(@NOW) }
234567
              /ppohX{Esc}@||
              (Contents NEXT, TIME, 9, 120)
              (If @LEFT(NEXT,1)="0"){Let NEXT,@MID(NEXT,1,8)}
    NEXT
              {BS}~qagq
8
    TIME
9
```

Figure 5: This macro is an alternative version of the one shown in Figure 4.

pressed Enter to complete the /Print Printer Ontions Header command, the characters in that label will be appended to the end of the header. For example, if NEXT contained the label '06:00 PM at this point. 1-2-3 would type 06:00 PM to the right of the characters @ | |, creating the header @1 1 06:00 PM

Once the macro has added the current time to the header, it will evaluate the final statement in the macro. This commands 1-2-3 to lock in the header and quit from the Options menu. 1-2-3 will then print the worksheet and quit back to the READY mode.-Marty Cuerdon: Castle Rock. Colorado

This macro works well. 1-2-3 recalculates @NOW only a fraction of a second before it begins printing a report, so the time that appears at the top of a page is almost the exact time at which 1-2-3 begins printing. One drawback of this macro, however, is that since 1-2-3 does not "recalculate" the header prior to printing each page, the same time will appear at the top of every page of a report.

If you wish to do so, you can change this macro in any of the following ways: First, since combined date and time values appear in time form when assigned time formats, you can replace the argument of the {Let} statement in cell B1 with the function @NOW. Second, you can add the optional arguments 9 and 120 to the {Contents} command in cell B2. This way, the macro will work correctly no matter what format is assigned to TIME or how wide that cell is. Last, you can insert the statement

B4: '{If @LEFT(NEXT,1)="0"}{Let NEXT, @MID(NEXT,1,8)}

between the statement in cell B3 and the cell named NEXT. This strips the leading 0 (if there is one) from the beginning of the label in NEXT. Figure 5 shows this revised macro.

Of course, you can use this same technique to enter the current time into a footer. To do this, you would simply replace the letter h within the statement in cell B2 with the letter f.

Contribute to the Clinic

Share your latest spreadsheet discovery through Spreadsheet Clinic. We'll pay \$50 or more for tips we print, plus an extra \$25 if you submit your letter on a disk. If you do, please include a printed copy. Mail contributions to Spreadsheet Clinic, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Productivity section).

HANSON & PC EXCHANGE ACCOUNTING

BEDFORD ACCOUNTING bedford (Redford Software) "The Perfect System for your

Growing Business. BEDFORD ACCOUNTING is a completely integrated accounting system that includes General Ledger, Payroll, Accounts Receivable, Accounts Payable, Inventory and Job Cost. Use each module as an independent software package ... or combine modules to form your completely

coordinated accounting package.

BEDFORD allows for greater flexibility in your reports, supports a completely user defined chart of accounts, manual or computer produced checks (even for payroll), keeps track of full or partial payments by customers, allows you to make full or partial payments to vendors, and offers quick pop-up capability to let you look up accounts and inventory Information.

The BEDFORD ACCOUNTING SYSTEM was judged to be PC Magazine's

Editor's Choice in a review of 59 accounting packages conducted by Price Waterhouse. "This is truly a (complete accounting) system. Bedford's six modules... are easy to install, easy to use, and so well integrated with one another that it makes accounting a snap — even for non-accountants."
BEDFORD ACCOUNTING ... IBM VERSIONBBDFORD ACCOUNTING ... MACINTOSH VERSION \$249

Also available: Peachtree Complete Accounting\$159 Dac Easy Accounting

LANDLORD/LANDMASTER (Sustems Plus)

"A Complete Property Management System-Easy to Use with Outstanding Flexibility The LANDLORD is a complete property management system that prints tenant statements, generates lease expiration lists, identifies late

payers, produces vacancy reports, prints checks and performs all functions required by landlords and anyone who manages apartments, condominiums, shopping centers or any commercial properties... \$595 The LANDMASTER contains all the features of

the LANDLORD plus adds a complete double entry accounting system to the package for general ledger, accounts receivable and accounts payable ... \$1250.





FORMWORX (Formworx) "Create Any Business Form Instantly"

"The best package we've seen for generating forms"... Compaq Magazine ... "faster, easier to learn, and more versatile than the competition.

FORMWORX lets you create any form instantly. Using FORMWORX'S advanced drawing tools, you can draw vertical and horizontal lines, boxes with dots, dashes or solid lines of various widths ... add heading and text using a variety of type sizes and styles ... and complete your form by adding any of 95 graphics fill patterns including shading and borders. FORMWORX outperforms all of the competition

FORMWORX WITH FILL AND FILE makes FORM-WORX into the most advanced productivity tool on the market. Now, you can actually make form overlays and fill in all the blanks on your form. Save it, recall it, per-form automatic mathematics and recalculations on your form ... and, if you use dBASE, it's totally compatible,

FORMWORX \$99.95 FOR	MWORX WITH FILL & FILE \$149.95
FORMKITS (70 or more professionally of	
Business Forms \$39.95	Personnel Forms \$39.95
	Project Management Forms \$39.95
Sales & Marketing Forms \$39.95	Graphics & Charts \$39.95

READY TO RUN ACCOUNTING WITH LOTUS 1-2- (Manusoft)



"The Full-Featured Accounting System that Runs Under 1-2-3." A completely integrated, full-featured, easy-to-run accounting system that works under full control of Lotus 1-2-3. Purchase individual modules or the complete system.

General Ledger .. Accounts Receivable\$49.95 Inventory Control/Order Entry\$69.95 Complete System (all 5 modules).......\$199.95

SUPPORTS BAR COOF READERS

MICROBIZ RETAIL STORE/CASH REGISTER CONTROL (Microbiz Corporation)

The MICROBIZ RETAIL STORE SYSTEM is an extraordinary system for managing all retail store sales, customers and inventory. Quickly bill your customers, keep track of your inventory, commissions, look up prices, print cash register receipts (or complete invoices) and perform all the day-to-day functions required to keep you on top of your business and its cash flow. It's time to

.....all for \$395. Optional add-ons to your Retail Store Software System...a complete cash drawer that plugs into your IBM PC or compatible, a receipt printer and bar code reader

Systems are also available for Video Stores, Beauty Salons, Liquor Stores, Auto Repair Shops and other vertical markets.

Retail Store/Computer Cash Video/Liquor Store Management.. \$795 Beauty Salon Accounting \$795 Register Software \$399 Bar Code Reader for Above \$595 The Auto Repair Shop Cash Drawer for Above..... \$495 Controller

> SUPER PRICE

The Professional Time and Billing System for Anyone Who Must Bill for Time and Service ... used by more accountants, lawyers doctors, consultants and other professionals than any other billing system."

It's unanimous. All the reviewers agree that TIMESLIPS III is the best time and billing system on the market ... and certainly equal to or better than packages selling for \$2000

and up. TIMESLIPS received one of INFOWORLD'S best ratings ever (9.3). TIMESLIPS is memory resident, offers a pop-up "stopwatch" to time phone calls and activities, generates transaction reports, client history, aged receivables and many valuable management reports. It interfaces with many software programs such as Bedford, Peachtree and DAC. You may even ex Lotus 1-2-3 and dBASE. CREATE THE PERFECT BILL with TIMESLIPS III.

TIMESLIPS III (for hard disk drive systems) \$114.00 TIMESLIPS (for floppy systems) \$ 97.00 TAL (link TIMESLIPS III to other accounting programs) .. \$ 79.95

We are the experts in accounting software. Choose from over 100 accounting packages, and vertical market packages. Call for great values on DAC EASY, PEACHTREE and more than 100 other business, accounting and vertical market PRACHI INEA unu more inun vos vones vonesnes, peakages.
Please call or write for our FREE 48 page full color catalog containing more than 100,000 hardware and software items ready to be shipped. All prices and specifications are subject to change. Delivery subject to availability. Add \$6 for shipping of the first item (\$51 or each additional item).

CIRCLE 301 ON READER SERVICE CARD

PC EXCHANGE

OVERNIGHT SOFTWARE DELIVERY
*Formerly PC EXPRESS

OFFICE

RODUCTIVITY







SPRING VALLEY, NY

FAX: (914) 426-2600 TELEX: 667962 (SOFT COMM NYK)

True CPU Power.



State of the art power usually comes with a state of the art price. Except at Computer Products United. At CPU, we design compatibles to extend the limits of technology and reliability. Not the limits of your budget.

Consider our 386/25. It gives you the performance of a real 80386-25. Not just a 20 trying to run like a 25. In addition, to get the most out of your standalone applications, we offer MS-DOS® and MS®OS/2 support.

386/25 \$3,295

- 80386-25 CPU running at 25MHz
- · 32K cache memory
- · Zero wait state, Norton V.3 SI rating: 29.7
- 1 MB memory (expandable to 8 MB using SIMM on board)
- · 384K shadow RAM
- · 1.2 MB floppy disk drive
- · 1:1 interleave dual floppy/hard disk controller
- · Ports: 2 serial, I parallel, 1 game
- · Clock/calendar with battery backup
- 101-key enhanced keyboard
- · AMI/Award BIOS
- · CPU80387 math co-processor socket
- · 8 expansion slots

If you need a few workstations to plug into your LAN, a fileserver that can handle a bigger load, or a complete turnkey network package complete with NetWare. CPU is your single-source answer offering all the security of our Novell Gold-authorized support.

For state of the art technology at a hands-on price, CPU is an exceptional value. With no exceptions.

386/20

\$1.995

- · 80386-20 CPU running at 20 MHz
- · Zero wait state, Norton V3 S1 rating: 23
- . 1 MB memory (expandable to 8 MB using SIMM on board)
- · 384K shadow RAM
- 1.2 MB floppy disk drive
- · Dual floppy/hard disk controller
- · Ports: 2 serial, 1 parallel, 1 game
- · Clock/calendar with battery backup · 101-key enhanced keyboard
- · AMI/Award BIOS
- · 80287/80387 math co-processor socket
- · 8 expansion slots
- · 64K cache memory system, \$2395

Unbelievable CPU Prices.



386SX

\$1.695

- · 80386SX CPU running at 16MHz
- · Zero wait state, Norton V.3 SI rating: 18.7
- · 1 MB memory (expandable to 8 MB using SIMM on board)
- · 384K shadow RAM
- . 1.2 MB floppy disk drive
- · Dual floppy/hard disk controller
- · Ports: 2 serial, 1 parallel, 1 game
- · Clock/calendar with battery backup · 101-key enhanced keyboard
- · Award BIOS
- 80387SX math co-processor socket
- · 8 expansion slots

286/12

\$995

- · 80286-12 CPU running at 12MHz
- · Zero wait state, Norton V.3 SI rating: 15.3
- . 512K memory (expandable to 4 MB using SIMP on board)
- · 1.2 MB floppy dlsk drive · Dual floppy/hard disk controller
- · Ports: 2 serial, 1 parallel, 1 game
- · Clock/calendar with 10 year battery life
- · 101-key enhanced keyboard
- · Phoenix/Award BIOS
- · 80287 math co-processor socket
- · 8 expansion slots

NOVELL. Gold-Authorized Dealer

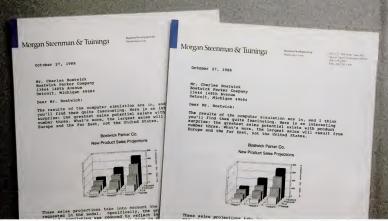
To order. call (800) 824-2936. In California: (800) 662-6111. Local inquiries: (818) 338-5959. Hours: Monday through Friday, 7 a.m. to 6 p.m.; Saturday, 10 a.m. to 3 p.m. PST. All systems carry a 30-day money-back guarantee excluding shipping charges. All basic systems carry a comprehensive I year parts and labor warranty. During this period, we will repair or replace, at our option, any defective part at no additional charge. Add-on products (hard drives, monitors, etc.) carry manufacturers' warranties.

We accept VISA, MasterCard, and cashier's checks. Purchase orders and personal checks



Copyright © 1988 Computer Products United, All rights reserved. Pricing and system configurations are subject to change without MS-DOS and MS are registered trademarks of Microsoft, Inc.

NetWare is a registered trademark of Novell, Inc.



AN YOU SP

One of the nearly identical samples you see above was printed with the HP Laserjet Series II. The other is from the Mannesmann Tally MT905. Both are reprinted here exactly as they came out of the printers.

But what might surprise you is the rather dramatic difference in the manufacturers' suggested retail prices.

The Mannesmann Tally laser is \$700 less. Yet it offers the same high quality output, lowers operating costs 25 percent, and prints at six pages per minute.

The MT905 comes with the same resident type fonts as HP, accepts standard HP font cartridges, and lets you choose optional memory upgrades from one to four megabytes.



MT905 Specifications

- Technology: scanning laser.
- Print Speed: 6-pages per minute.
 Resolution: 300 x 300 dpi.
 Emulations: HP Series-II. [optional emulations: Epson, IBM* Proprinter, & Diablo 630.1
- Standard I/Os: Serial & parallel.

 Memory: 512K. [upgrades: 1, 2, & 4 megabytes.]

 Typefaces: Courier medium & bold,
- line printer, accepts standard HP font cartridges or any downloadable font in HP-format, 6-resident fonts + 2 font cartridge slots.

 Paper Handling: 250-sheet input &
- output bins. Manual feed handles single sheets, envelopes, transparencies, and labels.
- Workload: 4.000 pages-per-month.
- Suggested Retail: \$1,995.

For more convenient paper handling, the universal paper cassette holds letter, legal, and international sizes, plus up to 15 standard envelopes. You can choose face-down output to keep long documents in the right

you print labels or transparencies. So any way you figure, the answer still comes up the same. The Mannesmann Tally laser looks perfect. And so does the price.

order. And the manual feed lets

For the name of your nearest dealer, call the toll-free number listed below.

MANNESMANN TALLY

Epson and 1BM are registered trademarks.

User-to-user



Maximize free memory with an alternative AUTOEXEC; display your computer's ID with a batch file: use ANSI escape sequences to create hard disk menus.

Track your bootups with an undocumented feature of CTTY

If you have an extensive AUTOEXEC .BAT file like I do, you are probably tired of seeing the same messages scroll past every time you boot your computer. Adding CTTY NULL to the beginning of your AUTOEXEC file would redirect console output and no messages would be sent to your screen. But this would also mean that you wouldn't see any error messages.

A better idea is to redirect the screen to a file that you can type out later. For example, to send all console output to the file AUTOEXEC.LOG, simply add

CTTY > AUTOEXEC.LOG

to the beginning of your AUTOEXEC .BAT file. Then if something does go wrong at boot time, you can use TYPE or a word processor to view the AUTOEXEC .LOG file, This is also great for those times when error messages flash by so fast that you don't have time to read them.

If you don't like a blank screen while booting, add

ECHO Please wait while system starts up

before CTTY > AUTOEXEC.LOG. This will let users know what is going on.

One final note, be sure to add CTTY CON

to your AUTOEXEC.BAT to return the console to normal. Put it before any command that requires operator input.-Douglas Hemminger: Elvria, Ohio

CTTY > AUTOEXEC.LOG may look like ordinary redirection, but it definitely is not. The fact that it works at all is directly contrary to the DOS manual. The manual states that CTTY must be followed by a valid device name, and that redirection is not supported. Despite the manual, you can redirect CTTY this way in DOS 2.0 to 3.3. The first line of your output will always be an error message from CTTY itself: "Invalid device."

The technique works, but you're using a DOS bug, not a DOS feature. Don't try to use it under DOS 4.0.

Build a hard-disk menu system with ordinary DOS tools

I've used many menu programs for hard disks, but the best menu system is one I made using batch files, ANSI escape sequences, and function keys. By using generic names for the batch files, I can use the same keys in any directory of my hard disk, making my system very easy to access. The first line in my AUTOEXEC .BAT file is

PROMPT Ser0:59:"F1":13p

where \$e[. . . p indicates an ANSI key redefinition, 0;59; is the scan code for redefining the F1 key, ''F1'' is the text string "FI", and 13 is the code for

In this example, the F1 key is redefined from its default value and now has a value of "FI" followed by Enter. When you press the F1 key, the computer looks for a

file called F1 with a .BAT, .EXE, or .COM extension. It finds F1.BAT, which reads

ECHO OFF CLS

CD GAMES

TYPE GAME.TXT

GAME.TXT is another menu. If you pressed Fl again you'd call a batch file named F1.BAT in the GAMES directory.

This will not interfere with any programs that use function keys to operate. The programs will take the keys and then, after you exit the program, restore them to the values you set.

The chart in Figure 1 shows the codes for function keys 1 through 10.-Daniel Ullman; Seattle, Washington

Redefining **Function Kevs**

Function key	Key scan code
F1	59
F2	60
F3	61
F4	62
F5	63
F6	64
F7	65
F8	66
F9	67
F10	68

Figure 1: To redefine the ten function keys, substitute the scan code listed next to the key in the expression PROMPT \$e[0;__;"F_";13p. For example: PROMPT \$e10:67:"F9":13p.

Do You Believe Software Can Make **A Computer**

The Editors Do!

For years minicomputers have used software techniques to improve the throughput of peripherals, Now Multisoft has developed a complete set of utilities based on these techniques to provide:

- faster disk access
- faster output to printers
- faster keyboard repeat rates
- faster video speeds

Nothing could be easier. A quick installation, a warm reboot, and from that moment on you will see what your computer can really do.

PC-Kwik Power Pak is a set of performance utilities that will amaze you in its power and simplicity. Power Pak contains Super PC-Kwik, the disk cache PC Magazine named its Editor's Choice.

Super PC-Kwik

"In overall performance. Multisofts \$79.95 Super PC-Kwik roared into first place in the PC labs benchmark tests" "When you combine it with



the RAM disk. print specier, and other programs in Multisoft's PC-Kwik Power Pak, Super PC-Kwik makes better use of your memory than any other cache you can buy."

Order Super PC-Kwik today and see what the industry's best disk cache can do for you, or get the most for your money with our 5-in-1 Power Pak

Super PC-Kwik Power Pak 30-day money-back as



MULTISOFT CORPORATION 15100 SW Koll Pkwy, Suite L Beaverton, OR 97006 800-444-KWI 503-644-5644

■ USER-TO-USER

```
ECHO OFF
PATH C:\MENU:C:\DOS
PROMPT Ser0:59:"F1":13p
PROMPT Se[0:60:"F2":13p
PROMPT $e[0;61;"F3";13p
PROMPT Se[0:62:"F4":13p
PROMPT $e[0;63;"F5";13p
PROMPT Se[0:64:"F6":13p
PROMPT Se[0:65: "F7":13p
PROMPT Se[0:66:"F8":13p
PROMPT $e[0;67;"F9";13p
PROMPT Se[0:68:"F10":13p
PROMPT SPSG
ECHO OFF
CLS
REM FKEYMENU.TXT is a file that you will create
REM to describe what each function key does.
TYPE \MENU\FKEYMENU.TXT
```

Figure 2: FKEYMENU.BAT illustrates how you can build a generic menu. What you put in files F1.BAT through F10.BAT will determine what this menu does.

The final comment about other programs using function keys isn't quite correct. Programs that use DOS to get input will be affected by the key redefinitions. However, all major applications read the kevboard in a more sophisticated way. They don't take away the key definitions and restore them—they simply ignore them.

If you normally load ANSI.SYS in your CONFIG.SYS file, this is a painless way to make yourself a menu. Note that since it defines each function key as "F?" (where ? is the number), it will always search the current directory first for a matching file. This means you can create submenus simply by having the F?.BAT file change to another directory that also contains F2.BAT files.

FKEYMENU.BAT in Figure 2 uses this technique. It assumes that you have a subdirectory called \MENU in which you store your F?.BAT files and the menu text. By putting C:\MENU on the PATH, you make the F?.BAT files available from any directory. However, local F?.BAT files in the current directory will supersede them. That's convenient!

Create a batch file that displays your machine's ID

Our school uses a mix of Tandy 1000 EXs and Cordata CS 40s hooked to various printers. Since beginning students can

never remember to use the correct .BAT file, we needed a way to set the correct printer definition based on the machine they were using.

ID.COM is called in a batch file, finds the machine ID and sets the ERROR-LEVEL. The batch file tests the ERROR-LEVEL and branches accordingly.

The machine ID for most PCs and compatibles can be found by starting DEBUG and typing

D F000:FFFE L 1<ENTER>

This will display two letters, which represent the machine ID in hex:

IBM PC, Tandy 1000 ØFFh (255) IBM PC XT, Cordata CS48 0FEh (254)

The machine IDs would need to be different for this to work. Since we have two

```
N ID.COM
RCX
A 100
MOV
         AX,F000
MOV
         DS, AX
MOV
         AL, [FFFE]
MOV
         AH,4C
INT
         21
```

Figure 3: Pass this script as input to DEBUG to create ID.COM.

Fill out your forms automatically. Build your database simultaneously.



form creation/draw package.

DisplayForm II includes many more benefits and optional features for simply filling out a single form

PS/2° has offered little help in solving a major paperwork problem – forms fill-in. Now, there is DisplayForm II,° the forms problem solver software from Deerfield Systems.

With DisplayForm II you can create dBaseIII+** compatible files simultaneously as you fill-in forms automatically. You can also merge information from dBase* or ASCII files during fill-in, edit, and print operations. So you not only gain productivity when a form is filled in, but also gain control of the information you create.

Setting up a form with DisplayForm II is simply a matter of scanning the pre-printed form to get a PC Paintbrush* PCX file, compressing it to fit the system monitor type, then locating fields and establishing data entry criteria. No time-consuming racing or re-drawing steps are needed. Your operators can see the form right on the monitor screen – even on a full page display (The Genius*)—where it can easily be filled in. If you don't have a form, or want to change an existing form, use DisplayForm II's built-in

or for solving your toughest forms handling problems: Powerful data entry capabilities with arithmetic calculations. A screen/FAX option to send a form directly from the screen. Support for printing text alone to most printers, or text plus image to graphics printers. The ability to run standalone or on a network, and loss more.

DisplayForm II offers power and performance beyond any other package on the market today. It runs without special hardware, yet can accommodate higher quality monitors and printing devices.

For more information, or to order, call the forms problem solving experts at Deerfield

Systems 1-800-356-8170, or write Deerfield Systems, Inc., 221 Elizabeth Street, Utica, NY 13501. Major credit cards.

DisplayForm II



■ USER-TO-USER

SCOD OFF

D

SET TO-malshows

SET TO-mal

Figure 4: GET_ID.BAT names your machine type and leaves the ID byte accessible in the environment variable ID.

different brands of computers with different IDs, it does.

To create ID.COM, type in the script in Figure 3 with a pure ASCII text editor. Be sure to hit the Enter key at the end of each line, and also to include the blank line before the W line. Then get back to DOS and type

DEBUG < GET_ID.SCR

to create the file. The batch file in Figure 4

shows a sample application.—Dennis Landis; Orrville, Ohio

The ID bytes can have eight values, from F8h (248) through FFh (255), with each value representing one or more machines.

Figure 4 is a batch file that displays the machine names associated with your computer's ID byte. One of the machine ID codes seems overloaded—FCh (252) is the ID for 4 different computers. On machines

with an AT or PS/2 BIOS, you can call interrupt 15h, function C0h to get the "submodel byte" that distinguishes among these machines. But the simple ID program presented here will at least distinrush between the eight main ID bytes.

I simplified the original ID.COM to make it return the computer ID bytes exactly. This way, if new machines appear with new ID values, ID.COM won't have to change.

METRO IMAGEBASE ELECTRONIC ART.

Professional-quality, high-resolution electronic art for serious desktop publishers.

- Professional-quality art created by leading illustrators.
- More than 4 times sharper than typical "clip art".
- One large image per file for easy manipulation.
- 100 usefully grouped images per package.
- Guaranteed satisfaction or your money back.





Works with: PageMaker, Ready, Set, Go!, Ventura Publisher, XPress, Cricket Paint and WordPerfect 5.0.

File Format: All Macintosh and MS-DOS PayeMaker disks use .TiF, Ventura Publisher disks use .PCX and WordPerfect 5th disks use .IMG.

System Requirements:

Computer: Macintosh 512E, Plus, SE, II and IBM systems configured for desktop publishing.

Storage: A hard-drive is strongly recommended.

Printer: Laser Printer

For information call: 1-803-525-1552, Fav: (818) 881-4557 (Outside U.S.: (818) 881-1997). Metro ImageBase, Inc., 18623 Ventura Blvd., Suite 210, Tarzana, CA 913%



Pictures that really make headlines. Seasonal, educational, holiday and sports. Images to illustral almost any occasion.



Computers & Technolo Images of people compring, monitors and keyboards, satellites and astronauts, research laboratories and more.



The Four Seasons

Art Deco

Borders & Boxes Decorative signs, symbols, corners, bursts, borders and more. For framing any document.



Business Graphics Serious and not so serio images to work with. Offices and office equip managers and meetings and financial amplicate



ReportMaker Political, social, industrial, agricultural and financial symbols. Image to give your reports



Food
A generous serving of images. Frotn soup to nuts, waiters and chefs, banquets and barbecues horders and more

Other available packages:

Weekend Sports
orts Nine to Five

Exercise & Fitness

Money-Back Guarantee

If you are not completely satisfied with the selection of images, return complete package within 10 days for a full refund.

complète package within 10 days for a full refund.

To order call toll-free: 1-800-525-15.

Federal E

Federal Express® overnight delivery (available on request)





Metro ImageBase, Inc. 18623 Ventura Blvd. Suite 210, Tarzana, CA 91356 1-800-525-1552, Fax: (818) 881-4557

Capyright - 1885 bins Combin Capyria, Nr. M rights reserved Marie Progetties and The Art of Electronic Publishing as traderwals of Marie Capyria, Nr. de Capyr

Use an alternative AUTOEXEC to maximize free memory for RAM-hungry programs

Occasionally, I use programs that are too big to fit in memory. Even with 640K of RAM, much of my memory is used by TSR programs invoked by AUTOEXEC. BAT and by Jarge device drivers (for example, a RAMdisk) in CONFIG.SYS. PC Magazine's INSTALL.COM and REMOVE.COM are excellent for managing TSR programs, but the device drivers in CONFIG.SYS can use too much memory.

To free up all the RAM I can, I developed a batch file that renames AUTOEX-EC.BAT and CONFIG.SYS, and prompts me to reset the system. The new AUTOEXEC.BAT file restores the original files, but until you reboot, DOS is the only thing still in RAM. The prompt indicates that RAM has been maximized, and I can

```
ECHO OFF
REM --
               -----THIS WORKS WITH THE FILE MAXRAM.MAX
IF NOT EXIST CONFIG.MAX GOTO RENAMER
DEL AUTOEXEC.BAT
RENAME AUTOEXEC.MAX AUTOEXEC.BAT
RENAME CONFIG.MAX CONFIG.SYS
CLS
        MAXRAM has renamed AUTOEXEC.BAT and CONFIG.SYS.
ECHO
ECHO
        The system will be normal when it is reset.
GOTO END
: RENAMER
RENAME AUTOEXEC.BAT AUTOEXEC.MAX
RENAME CONFIG.SYS CONFIG.MAX
COPY MAXRAM. MAX AUTOEXEC. BAT
CLS
        MAXRAM has renamed AUTOEXEC.BAT and CONFIG.SYS.
ECHO
ECHO
        The maximum amount of memory will be available
ECHO
        when the system is reset.
ECHO
ECHO
        Reset the computer now
ECHO
        CTRL + ALT + DEL
PROMPT Press Ctrl-Alt-Delete NOW!
: END
```

that RAM has been maximized, and I can | Figure 5: MAXRAM.BAT sets up your computer to reboot with maximum free RAM.

IS YOUR FILE THE ONE THAT GOT AWAY?

Nothing is more frustrating than losing important files. Your best protection against catastrophic data loss is using Point-And-Shoot PC FullBak. We can solve your backup problems with the fastest, easiest, and most reliable backup utility on the market.

FAST! Point-And-Shoot PC-Fullbak gives you blazing backup speed on your IBM PC, XT, AT, PS/2 30, 50, 60, 80, 80386 or true hardware compatible at up to 25 mbz!

SIMPLE! Just use the light-bar menu to select and mark the files you want to back up! Back up data all over your hard-disk with a single command!

RELIABLE! Point-And-Shoot PC-FullBak keeps your data safe—but don't take our word for it: "The product has never failed to give me a reliable RESTORE."—Jim Seymour, Micro Business

"Quick, clean, fast and is heartily recommended!"— Marvin Bryan, PC Week

"It's made a chore that usually takes 45 minutes into a 7-minute walk in the park."—Anthony W. Czarnik, Ohio University

WHY WAIT? Get Point-And-Shoot PC-Fullbak NOW before your valuable data decides to swim away! Visit your local quality software dealer, or order by phone at (512) 328-1041. Your satisfaction is guaranteed—or we'll refund your money! \$129.95

And that's no fish story.



P.O. Box 1711, Austin, TX 78767 Telephone: (512) 328-1041

AWARD-WINNING Software!

The award-winning family of products from Westlake Data Corp. has received PC Magazine's Editor's Choice Award and has been nominated for PC Magazine's Technical Excellence Award

WESTLAKE DATA @ CORP

CIRCLE 485 ON READER SERVICE CARD

■ USER-TO-USER

then run my large programs. The next time I reset the system, I will have the use of my TSR programs and RAMdisk, and everything is back to normal.

MAXRAM.BAT in Figure 5 and MAXRAM.MAX in Figure 6 work together. MAXRAM.BAT does all file renaming and MAXRAM.MAX replaces AUTOEXEC.BAT.—David F. Hill; Austin. Texas

I use a very similar technique to manage conflicting EMS drivers—loading a different one requires me to switch to a different CONFIG.SYS and reboot. In order to make sure I don't get distracted and forget

PROMPT MAXRAM SPSG

ECHO OFF

CLS

MAXRAM

to reboot, I change the prompt to a reminder. I've added this feature to MAXRAM .BAT.

If you do use a system like MAXRAM, be sure to keep spare copies of your AU-TOEXEC.BAT and CONFIG.SYS, and keep the copies up to date. It's always possible that something untoward could happen and you could lose your AUTOEX-FC.BAT.

Productivity Tip

The REPLACE command (introduced in DOS 3.2) lets you undate files on one disk

with their newer versions from another disk. Suppose you copied three floppy disks to a single hard disk directory and made changes to the files on the hard disk. You can automatically copy only the updated files back to the appropriate floppy with the command

REPLACE *.* A:

Share Your Secrets

Reveal your latest DOS and systems discoveries through User-to-User. We'll pay you \$50 or more for any submissions we print, plus an extra \$25 if you send your letter on-disk. If you do, please include a printed copy. Mail contributions to Userto-User, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join see the "By Modem" sidebar in the Productivity section). [38]

Figure 6: MAXRAM.BAT replaces AUTOEXEC with this file, MAXRAM.MAX.

REM -----THIS WORKS WITH THE FILE MAXRAM.BAT

CO/SESSION[™] IS THE FASTEST, EASIEST, MOST POWERFUL REMOTE COMPUTING SOFTWARE!

Remote PCs need no longer remain remote with the powerful new features of CO/SESSION 3.1. CO/SESSION is the ideal solution for all your PC communication needs.

HOME COMPUTING Use CO/SESSION to work at home and run your office PC as if you were there. Access files, execute DOS commands, run programs, print reports and more.

CUSTOMER SUPPORT Provide on-site support and training to customers without moving an inch. CO/SESSION allows you to work with remote users as if you were there.

NETWORK ACCESS Link remote users and offices to your network and enjoy on-line access to all the network resources.

FILE TRANSFERS Transfer files by modem or direct cable. CO/SESSION is ideal for laptops, home and remote offices!



AUTOMATED SESSIONS Add the ability to automate and schedule file transfers, printing and running of programs on remote PCs with SESSION/XL.

BETTER THAN CARBON COPY PLUS CO/SESSION is up to 400% faster, easier to use, more powerful and lockup free. If you're a current Carbon Copy user, ask about our upgrade program. You'll see the difference in minutes.

IMMEDIATE AVAILABILITY Call boday for additional information on CO/SESSION and SESSION/XL or visit your nearest dealer and tell them you want the best in remote computing software. CO/SESSION can be purchased in single or two machine licenses.

CALL-201-855-9440 FAX-201-855-9608

POWER USER

WordPerfect 5.0's advanced macro features give you a great deal of power and flexibility. Here are some useful techniques for creating your own pop-up menus.

WordPerfect 5.0's advanced macros let you create your own pop-up menus and help windows

The advanced macro features in WordPerfect, Version 5.0, are seriously underdocumented. It's a shame because when properly applied, they provide a great deal of

extra power and flexibility.

While writing a book on WordPerfect macros for Bantam Computer Books, I found that one of the least understood macro features is the {*P} display code, which is used to place a message anywhere on the screen. The {*P} code is used in [PROMPT], {TEXT}, and {CHAR} message strings, and it is followed by two

characters. The first character indicates a column position (from 1 to 80); the second character indicates a line position (from 1 to 24). By judiciously calculating the column and line positions, you can produce pop-up menus of any size or shape.

The {^P} display code uses either control characters (^A, ^B, ^C, and so forth), or the IBM Extended Character Set characters.

```
^P)Öl
-P)ÖÄ
-P)ÖÄ
(ON CANCEL) (GO) cancel --
(ON NOT FOUND) (GO) not . found --
(LABEL)draw-font-box-
(CHAR)1-
(^P)60
                                                                                  (IF) (VAR 8)<128"
                                                                  {Enter}
{Enter}
                                                                                  (GO)wrong·size
      ^P)56 ··Select·a·font:·····
      | Pjo6 | Select a font:
| Pjo6 | 1 - Nelvetica Pold-
| Pjo6 | 3 - Nelvetica Pold-
| Pjo6 | 3 - Nelvetica Pold-Oblique |
| Pjo6 | 4 - Nelvetica Pharrow Pold-Oblique |
| Pjo6 | 6 - Nelvetica Pharrow Pold-Oblique |
| Pjo6 | 7 - Nelvetica Pharrow Oblique |
                                                                   (Enter)
                                                                   (Enter)
                                                                   (Enter)
                                                                                  (IF) (VAR #1>3"
                                                                   (Enter)
                                                                                        (ELSE)
                                                                   (Enter)
                                                                                            (GO)wrong.size
                                                                                  {END IF}
{GO}choose · font
                                                                   (Enter)
               ··8··Helvetica·Oblique·····
                                                                   (Enter)
      *P) 61
                                                                                  {LABEL}wrong·size~
                                                                                        (PROMPT)Choose · a · size · between · 4 · and · 127 · points · · ·
{LABEL}test .entry
(IF){VAR 1}>0
                                                                                       (GO) draw-size-box-
     (ELSE)
         (GO)wrong.entry
                                                                                  {LABEL}choose · font ~
{DISPLAY OFF}
(IF) (VAR 1)<9"
                                                                                  (CASE) (VAR 1)
     (ELSE)
         (GO)wrong.entry
                                                                                        1"Hel"
(END IF)
                                                                                        2"Bold"
(GO)draw.size.box
                                                                                        3 Bold oblique
                                                                                        A"WATTOW"
{LABEL}wrong · entry
                                                                                        5 Narrow bold 6 Narrow bold oblique
     {LOOK}1
     {PROMPT}{Home}"
{GO}test entry"
                                                                                       7"Narrow.oblique'
8"Oblique"
{LABEL}draw.size.box {DISPLAY OFF}
                                                                                   (Font) 4nHelvetica(Enter)1(VAR 8)(Enter)
      (DISPLAY ON)
                                                                                  (LABEL)Bold
{TEXT} 6
```

Figure 1: This WordPerfect 5.0 macro uses a pop-up window to prompt for a font selection; it illustrates several advanced macro techniques.

■ POWER USER

```
(Font)4nHelvetica.Bold(Enter)1(VAR 8)(Enter)
(OUIT)
(LABEL) Bold · oblique
{Font}4nHelvetica.Bold.Oblique{Enter}1{VAR #}{Enter}
(OUIT)
(LABEL) Narrow
{Font}4nHelvetica · Narrow{Enter}1{VAR $}{Enter}
{LABEL}Narrow-bold
(Font) 4nHelvetica · Narrow · Bold(Enter) 1 (VAR 8) (Enter)
(OUIT)
{LABEL}Narrow.bold.oblique
(Font) 4nHelvetica Narrow Bold Oblique (Enter) 1 (VAR #) (Enter) (QUIT)
(LABEL) Narrow-oblique
(Font)4nHelvetica.Narrow.Oblique(Enter)1(VAR #)(Enter)
(OUIT)
{LABEL}Oblique
{Font}4nHelvetica.Oblique{Enter}1{VAR 8}{Enter}
(QUIT)
{LABEL}cancel-
    (DISPLAY OFF)
    (DISPLAY ON)
    {TIUQ}
(LABEL) not · found
    {PROMPT}Sorry, .can't.find.the.font...
    (BELL)
    (WAIT) 15"
    (Exit) (Exit) (DISPLAY OFF)
```

(Figure 1 ends)

acters (those with an ASCII value of 128 or more). The control character method is not recommended, as it precludes putting the start of the message at some locations on the screen. The better method is to use the Extended Character Set. Enter the appropriate column and line characters by holding down the Alt key and typing a number into the numeric keypad (not the number keys on the top row of the keyboard). For example, to enter ASCII 128, press and hold the Alt key, and type 1 2 8 on the numeric keypad. The Ç character will appear.

(QUIT)

You need to identify both the column and line after the {19} code, so you must enter two codes. The column code goes first, followed by the line code. For example, to position the message at the upper-left corner of the display (ASCII 128 for the lollourn and ASCII 128 for the line), enter

```
(^P)CC Your message goes here.
```

To determine the proper ASCII number to use for other locations, add 127 to the desired column or line number. To place

the message starting at column 30 and line 15, for instance, use ASCII 157 (127 + 30) and ASCII 142 (127 + 15). In the IBM extended character set these will show onscreen as ¥ (ASCII 157) and Å (ASCII 142)

You can start the message anywhere along the width of the display, up to column 80 (ASCII 207). After that, Word-Perfect automatically wraps the start of the message onto the next line. Wrapping will also occur if the message extends beyond the 80th column. Additionally, you can start the message along the length of the display up to line 25. Realistically, you would not use the 25th line with the {*P} display code, however, since that is the status line used for WordPerfect message promnts.

A pop-up window is composed of separate lines in a {PROMPT}, {TEXT}, or {CHAR} message, and it has the effect of temporarily overwriting any text that's underneath. Once the window is removed from the screen, the original text reappears. By formatting the lines of the message with a box frame, you can make a realistic-looking pop-up window.

By way of illustration, Figure 1 contains a sample macro that displays a popup window that allows you to select one of several Helvetica font typefaces (it's for use with a PostScript-compatible laser printer). A second, smaller box prompts for the point size of the font.

Text within the pop-up window is formatted using empty spaces. Each line of the window must end with an {Enter} code. Be sure that you use the proper screen locations after the {-P} code or your window will be literally "shattered"—with segments strewn all over the screen!

Sadly, you cannot use WordPerfect's Line Draw feature to make box frames for your pop-up windows. You must create them in the macro editor yourself by depressing Alt and typing a number on the numeric keypad, or with WordPerfect's compose key.

When using the Alt-key method, press the Alt key and a number on the keypad for each segment of the frame. Use the Backspace and Delete keys to remove unwanted segments. When using the compose key method, press Ctrl-2, type the code for the segment you want to use (don't forget the comma), and press Enter. Repeat the process for each segment of the frame. Use the Backspace and Delete keys to remove unwanted segments.—Gordon McComb; Canoga Park, California

You can experiment with this macro even if your printer doesn't support Helvetica. You'll just get the message "Sorry, can't find the font" at the end. Naturally you're free to modify POP-UP.WPM so it presents fonts available on your system.

POP-UP WPM uses many advanced macro features, so you can't just enter it in Macro Definition mode. You must carefully construct it within the macro editor. First, start an ordinary macro definition with the name POP-UP. Enter a description, if you like, and immediately end the definition by pressing Ctrl-FIO again. Now define POP-UP one more—this time you'll get a message inviting you to either replace the existing blank macro or delit it. Select 42, Edit, and you're in the macro editor. Again select #2 to get into editing the macro action.

From here on, you'll need to refer care-

Discover PC-Link®



Unlimited online usage for just \$9.95 a month

Finally, an online service for MS-DOS* computer owners has arrived offering a wide variety of exciting and informative services for just \$9.95* a month—no matter how many hours you spend online.

online.

Introducing PC-Link.
With PC-Link's friendly,
menu-driven DeskMate'
interface, you'll discover the services you want—at a
great low price
that won't have
you watching
the clock.
Services like
a Software
Buyer's
Guide,

PC-Link

stock quotes hot off the wires, American Airlines EAASY SABRE™ Academic American Encyclopedia™ and news from USA Today*.

Plus, there's more.

As a PC-Link member, you'll also have access to the premium services of PC-Link Plus at the low rate of 10 cents* a minute. No extra charges for 1200 or 2400 baud users! PC-Link Plus features services designed exclusively for PC owners, including an impressive selection of software for downloading, help from PC experts, clubs, special interest groups and more.

Your first month is FREE!

This special offer entitles you to 1 free month of unlimited access to PC-Link, plus 2 free hours** of PC-Link Plus services—every—thing you

need to get you started with your purchase of the PC-Link Software Package for just \$29.95***. That's a \$21.95 value, yours FREE when you become a PC-Link member. What's more, you'll receive a subscription to PC-Link Update, your guide to all the exciting events and services online Don't delay! Order your PC-Link Software Package today for just \$29.95.

Or visit leading computer and software dealers near you.

Call 1-800-545-6572 Ext.3183

month of unlimited access to PC-Link	C-Link member! I understand that m t Software Package includes 1 FREI nk, plus 2 FREE hours of evening of ices, and a subscription to PC-Link 5.
Full Name	
Street Address	
City/State/Zip	
Daytime Phone Number Disk Size 514 31/2	Evening Phone Number
Enclosed is my \$29.95 payment. I'm p MasterCard Visa Che	aying by sck
Credit Card #	Exp. Date
Signature of Cardholder	
Mail to: PC-Link 8619 Westwood Center Drive Suite 200 3183 Vienna, VA 22180	PC-Link

Desk Mate

**Rates higher during business hours and outside continental United States "Evening and weekend usager rate of locat per mineta spiess." **Bequires "Evening and weekend usager rate of locat per mineta spiess. **Bequires business and spiess of the location of the locatio



CIRCLE 203 ON READER SERVICE CARD

MOVING?

Please write to: PC Magazine, P.O. Box 54093, Boulder, CO 80322. Include your mailing label from a recent issue of PC Magazine for faster service. Please allow up to 60 days for change of address to take place.

■ POWER USER

fully to Figure 1. There are several kinds of elements in the macro. Special commands, variables, and command keys appear in curly braces { }. Everything else is ordinary text.

- To insert a special command, hit Ctrl-PgUp and select it from the menu.
- To insert a command key, press Ctrl-V followed by the key.
- To insert a variable, press Ctrl-V and Alt-n, where n is the number of the variable.
- To insert ordinary text, just type it in. Within the ordinary text, this macro uses six line-drawing characters to create boxes. It's easiest to enter these using the All-key method. The character numbers are: horizontal line, 205; vertical line, 186; upper-left corner, 201; upper-right corner, 187; lower-left corner, 200; lower-right to the corner, 200; lower-right corner, 200; lower-right

As you type, you'll notice that space characters in your macro are represented by a midline dot character. Press the Enter key at the end of lines, as usual. What is shown as {Enter} is a command key, so you'd press the three-key combination Ctrl-V-Enter to insert it. Don't try to type in the special commands using the { and } keys!

Creating this macro will take some effort, but you'll learn quite a bit about the advanced macro features of WordPerfect 5.0 in the process. When you've studied this one, add pop-up windows to your own macros. Anywhere you're prompting the user for information, you can expand the prompt into a helpful window.—Neil J. Rubenking.

Share Your Power

Tell fellow users your latest technical tips for hardware and software applications (other than spreadsheets, networks, languages, or DOS) through Power User. We'll pay \$50 or more for any tips we print, plus an extra \$25 if you submit your letter on-disk. If you do, please include a printout. Mail contributions to Power User, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to the PC MagNet (to join, see the "By Modem") sidebar in the Productivity section).

We'll take your stats and make you the most valuable player in your league.



Data analysis software from SPSS® gives your PC a winning advantage.

It doesn't matter which field you play hardball in. The right combination of equipment and ability can make you a hero.

You get that ability with SPSS/PC+," the best-selling data analysis software from SPSS. It's designed for the IBM PC/XT," PC/AT," PS/2" and compatibles. And with it, you'll turn raw data into real facts, for sound business decisions.

SPSS/PC+ features a base package of numerous statistical procedures. Plus some

powerful options for data entry, advanced statistics, forecasting, graphics, mapping and much more. So you can scrutinize and manipulate your data in countless ways.

SPSS/PC+ also provides a seamless interface with other popular PC software such as dBase™ and 1-2-3," to give you complete command of your data. For market research, sales analysis, quality control and much more.

Yet, SPSS/PC+ is designed for ease-ofuse, it features a menuing and help system. as well as an on-line statistical glossary that helps you interpret results as you go.

And you'll always have training, support,

and ongoing upgrades from SPSS. The team that's supplied statistical software to over 1 million users since 1968.

For more details on how SPSS/PC+ can help you get the most out of your micro. give us a call at

1-312-329-3316.

We'll show you how to really stand out in your field.

Best in the final analysis.

444 North Michigan Avenue • Chicago, Illinois 60611

irk of SPSS Inc. IBM PC/XT, PC/AT and PS/2 are trademarks of Inte shion-Tate. 1-2-3 is a trademark of Lotus Development Corporation. SPSS is a registered trademark of SPSS Inc. SPSS/PC+ is a ti

To learn Microsoft QuickBASIC, you only need a manual this thick.



You're looking at something you won't see anywhere else.

It's called QB Advisor. A remarkable new hypertext electronic manual that can make you instantly more productive, even if you don't know the first thing about programming QB Advisor actually lets you experiment by cutting and pasting useful sample programs right into your programming window. Only Microsoft has it. Only Microsoft could. And it's just one of the things you'll learn about new Microsoft* QuickBASIC version 4.5 for IBM* PCs and compatibles.

Another is the step-by-step tutorial that actually takes you through every stage of programming by working you through a complete program.

And QB Express—the interactive way to learn all about your programming environment in a matter of minutes—not hours.

Microsoft QuickBASIC also comes with Easy Menus that let you develop programs with a minimum number of menu choices. Contextsensitive Help for immediate help with error messages and variables by simply punching a key, or clicking a mouse. And a builtin debugger that lets you see

Microsoft Quick BASIC

exactly what your program is doing, as it's doing it.

Best of all, Microsoft Quick-BASIC is packed with enough power to handle whatever problems drove you to programming in the first place. Fact is, it translates your program into executable code at

an incredible 150,000 lines per minute.

Microsoft QuickBASIC version 45. If programming is the only way out, this is the easiest way in.

Microsoft Making it all make sense:

■ EDITED BY ROBERT L. HUMMEL

LANGUAGES



A quicker way to search text in BASIC; Turbo Pascal routines for creating your own editor; an automatic word-align function in Turbo Pascal 5.0.

Writing your own editor? These Turbo Pascal routines may get you started

When handling text files in Turbo Pascal, it is convenient to read the file into an array of strings. While this may be fine for some applications, the array size is limited by the 64K data segment that must be shared with other variables. Another way to buffer text

is to allocate memory dynamically from the heap using GetMem.

My sample program LINKTEXT
PAS, shown in Figure 1, demonstrates
how to read a text file into a singly linked
list. Each element in the list contains a
string and a pointer to the next element.
The "Head" record is actually a dummy
element, which contains only a pointer
field that always points to the first real element in the list. Notice that we must allo-

cate 5 bytes more than the length of the string. This allows for the length byte of the string and the 4 bytes required for the pointer field.

The procedure DisplayFile traverses the list from top to bottom and writes each line of the list. The Delete line and Insert-Line procedures show how to insert and delete records from this type of list by changing pointers.—Michael A. Reeder; Beaumont, Texas

```
FROGRAM LinkText;
USES Crt; { Omit this line for version 3 }
TYPE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PROCEDURE DisplayFile; { DisplayFile traverses the list and writes each line }
          IMS CTt; \ --
AnyEtr = STRING[285];
LinePite - LineNectype;
LinePite - LinePitr;
LinePiteld : AnyEtr;
LinePiteld :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ir := Head*.HextLine;
HLE Cur <> HIL DO
SEGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       WriteLn(Cur*,LineField);
Cur := Cur*,NextLine;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ( of DisplayFile )
             TextFile : Text;
Heed : LineFtr;
Hold : LineFtr;
Cur : LineFtr;
                                                                                                                                                                                                                          { Input File
{ Head of List
{ Place Holder
{ Current Line
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ROCEDURE DeleteLine(N : Integer);
DeleteLine deletes the Mth line of the buffer.
             FileName: AnyStr;
Ok: Boolean;
LineSuf: AnyStr;
L: Integer;
                                                                                                                                                                                                                          { File Hame
{ I/O Error Fleg
{ Input String
{ Line Humber
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  FROCEDURE LoadFile;
(LoadFile prompts for e file name and
loade the file into e linked liet)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Hold := Cur;
Cur := Cur'.HextLine;
Count := Succ(Count);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ( Seve Current pointer )
( Advance to next line )
( Increment counter )
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END;
IF (Cur <> HIL) AND (Count = N) THEM
                        Cirkor;
Write('Enter File Hame: ');
Reedin(FileHame);
Assign(TextFile, FileHame);
($I-) Reset(TextFile) (I+)
Ok := (IORSUIT = 8);
IF Ok THEM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NOIM

Bold*.NextLine := Cur*.NextLine; { skip current line }
FreeNess(Cur, Length(Cur*.LineField)+5);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ( of DeleteLine )
                                        SECTI
                                                   GetMem(Heed, 4);
Heed'.MextLine := HIL;
Hold := Heed;
WHILE NOT Eof(TextFile) DO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ROCEDURE InsertLine(N : Integer; NewStr : AnyStr);
InsertLine inserts the line NewStr before line N. )
                                                                                                                                                                                                                       ( Initialize Head )
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Count : Integer;
NewLine : LinePtr;
                                                                           NOIN

ReedLn(Textrile, LineSuf);

ReedLn(Textrile, LineSuf);

Rethes(Cur, Length(LineSuf);

Rethes(Cur, Length(LineSuf);

Rethes(Cur, Length(LineSuf);

Rethes(Cur, LineSuf);

Rethes(C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GIN := Heed;
Count := Heed;
Count := 1;
MHILE (Count < N) AND (Cur <> NIL) DO
                                   Close(TextFile);
END;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Mold := Cur;
Cur := Cur*.NextLine;
Count := Succ(Count);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ( Seve current pointer )
( Advence to next line )
( Increment counter )
                                                                                                                                                                                                                       ( of LoadFile )
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (continues)
```

Figure 1: The LINKTEXT PAS program provides the basics for writing a simple editor.

LANGUAGES

Borland's Editor Toolbox contains a data type similar to the LineRecType in LINK-TEXT.PAS. The Editor Toolbox version is fancier, with links both forward and backward, and a "flags" byte to hold special codes. But the basic technique is the same.

If you were actually going to build an editor around the routines in Figure 1, you would need to add at least two more features. First, you'd need a routine to unload a file. It wouldn't be difficult, but for each line you'd have to use FreeMem to deallocate exactly the same number of bytes that you allocated with GetMem. Second, you'd need a routine to edit a line. The eas-

iest way to do that would be to use existing routines to delete the old line and insert the edited version.—Neil J. Rubenking

Documenting fields in the BASIC BLOAD Header

I would like to make a correction to Ethan Winer's excellent article "Fast Screen Writing in BASIC, Part 1" (PC Lab Notes, October 13, 1987). The sixth and seventh bytes in a binary file created by BASIC with BSAVE hold the file's length, which is used by BASIC to know how many bytes to load, even if the file is

larger. I take advantage of this by writing information about a BSAVEd screen directly following the screen data. When the file is BLOADed only the original screen is retrieved, and not the other information in the file that follows.—Ted Swirsky; Horsham, Pennsylvania

While I was working on that article I wondered aloud why the BLOAD header also included the SEGMENT from which a file had been saved, because it did not appear to be used for anything. I discovered that if an address is not given when a file is BLOADed, the original address and the segment will be used.—Ethan Winer

Five easy ways to boost

Professional Basic

charger for QuickBASIC". Thousands programmers rely on PsoChas to make the life easier and to enhance their prograwith features like:

e A 1,000 page 2 volume menual e Full featured windowing

Create dazzling screens in text mode, CGA EGA, VGA or Hercutes graphic modes. Save and restore screen snapshots to arrays EMS memory or lites. Full featured window log to meet the most demanding jobs. The PaoBas system of virtual screens allows you to draw full or partial screens allow you to draw full or partial screen is memory, and then snap them on in er

Sich of unaning out of string space? Bits hundreds of it in numeric arrays or make hundreds of it. In numeric arrays or make the string of kilding is kilding its list of the string of kilding is kilding its list of the string is string in the string in the string in the string is string in the string in the string is string in the string in the string in the string is string in the string in the string in the string is string in the string in

PaoBas gives you e complete set of blastingly-field file routines. Read or write huge chunks of date at a citis, with file locking and eror handling so that you can even use them in subprograms. You it never want to use BASICs file I/O again Sort date with lightning fast array and pointer sorts. Search files or arrays at assembly speeds. PaoBas also has over 200 other essential services including handly stirring date. time, processing the program of the program of the services including handly stirring date. Item.



directory and array manipulation, string, screen and date compression, full mouse support, valuable equipment and input pulling and feater replacements to most

sether you are a professional or a novice, oblias will boost your BASIC in ways you used the same possible. PaoBas allows prosionals to save time and work and since rices writs professional quality programs city and savily. After all, how much is any house of your time really the professional pour time really the professional pour time really the professional programs of your time really the professional professional

BASCOM including BASCOM

P.M.

Paodiarra is a collection of over 150 highered froutines that provide mathematic functions and operations for programme who often work in mathematics, science or engineering. Complex versibles, near an complex matrices, real and complex from the complex matrices, real and complex from the complex matrices, real and complex from the complex matrices, and the complex matrices and the comp

For years Fortran has been the language choice for scientific and engineering a phications, but it tacks many of the usel features of QuickBASIC. Paofitatre or leatures of QuickBASIC. Paofitatre or leating most of the Fortran mathematical a numeric functions and allows you to easi translate Fortran code to BABIC or win new programs in BASIC white retaining Fortran has programs in BASIC white retaining Fortran has programs.

The Pacificate manual is over 200 pages and provides a complete description o each routine, including any algorithm and the mathematical formula the routine uses shown in standard notation. For Quick

PROREF TO On-Line Help

PaoRar provides pop-up help for I routines in PaoRaa and is an extension the QuickBASIC programming environme Find help on eny routins with a few k atrokes or mouse clicks. Pop-up an AS chart, calculsior, scan cods module, b diagram, your own help information almost any DOS program vie e hots.

ProBas.

hs TooLKIP is a collection of assem not BASIC modules that use the Paoli brary to sare you even more hours of gr rork: Why spend hundreds of hours twenting the wheel when you can just p in TooLKIP modules like:

nork. Why spend hundreds of hours reenting fibe wheel when you can just p n Toos.Rrr modules like: • Mens Generators • Fast 8-tree IndexIng • Mini-aditor with word-wrap

Fast B-tree Indexing
 Mini-editor with word-wrap
 Patch ,EXE files
 Protected storage areas
 Julian date routines
The ToouKirr also includes clock, cr

more, complete with BASIC source cor and a comprehensive manual. The Paoli. TooLKIT adds capabilities and helps co serve your most valuable search of all—tim Requires Paolias. Just \$98.00!

ProScreen

PaoScasses is stuff-setured screen pens dorriedfort hist will save you more design and coding time then you ever though possible. PaoScasses treats screens like word processor treats text to provide complete control over characters, colors, an piete control over characters, colors, and job possible. PaoScasses of the include delined masks. Use PaoSkas or the include the screens. So should you generated the screens will be supported to the screens of the screens large on-line help, and a 250 page manua. Just 198,001. PROBAS...
TELECOMM TOOLKIT

TELECOMM TOOLKIT

of PaoBas TELECOMM TOOLKIT is a colction of high-level communications
odules that you plug into your code to pro-

Xmodem/Modem7/Xmodem-1 k Ymodem/Modem7/Xmodem-1 k Ymodem (single and batch) CRC-18 and Checksum VTS2, VT100, AMSI 888 atc.

VISZ, VITOU, ANSI BES SIG.

Auto Dister & data base

Documented BASIC source
by use clumsy SHELLs to compi
ninal programs when you can pi
t the communications routines y

thirty day, money-back guarantee assures the highest quality and our lechnical supstall is always ready to help. Try our BBS

HAMMERLY COMPUTER SERVICES, INC.

(800) 343-7484

1 St DD per nam (St DD Canada for shopping per order rige 539 DD for 1st nam play 55 DD for each additional in Yhia, MCC, C DD, 615 Dhirp checks and approved a cologistic Transmish Produce Pachery, Pachessass Mura. Hammerly, Computer Services, Inc. Quick SCC, SAECOM Microsoft Corp.

CIRCLE 380 ON READER SERVICE CARD



ERROR-CONTROL FOR FORCES BEYOND YOUR CONTROL.

The hazards faced by your high-speed data can be truly shocking.

That's why, in addition to providing the original V-series[™] error-control. Hayes V-series 2400 and 9600 bps modems now offer error-control in either international standard V-42 or X-25.*

The V42 protocol, for point-to-point communications, automatically detects errors and then retransmits the data correctly. While the X.25 protocol not only efforce error control but also published in a control with the published protocol and the control with the control with

offers error-control but also multisession access to value added networks with expanding applications for dial-up X.25 point-to-multipoint communications.

V-series modems still provide users with data compression that can double throughput. And Hayes

AutoSync for built-in synchronous communications without the added expense of a synchronous adapter card.

All to give you more control. Because with a Hayes, the only error you can make is not buying one.

MHaves'

For your nearest Hayes Advanced Systems Dealer call 800-635-1225, Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. Hayes

NEW BLAISE TOOLS

The fastest way to create powerful programs with Turbo Pascal 5.0 and Turbo C 2.0!

Blaise Computing, manufacturer of function libraries that offer easy-to-use solutions to your programming needs, introduces:

POWER TOOLS PLUS/5,0-\$149

-completely integrated and lightning-fast routines to help you:

- ◆ Add moving bar pull-down menus and windows to your user interfaces; NEW ◆ Generate context sensitive help screens; NEW ◆ Add easy to use date and time conversion noutines; NEW ◆ Let users choose from window oriented pick lists; NEW ◆ Create and access* Phage* data structures; NEW ◆ Use multiple-line cell fields with fully configurable cell keys; NEW ◆ Speed up your sorting
 - with flexible in memory sort routines; NEW?

 ◆ Add EMS support; NEW? ◆ Write TSRs and ISRs easily;
 - ◆ Control DOS memory allocation;
 ◆ Create powerful programs in Turbo Pascal 4.0 & 5.0!

Turbo C TOOLS/2.0-\$149

-tight, fast, high quality functions to help you:

- ◆ Add easy to use mouse support for windows and menus; NEW?
 ◆ Quickly include virtual windows and menus; KEW?
 ◆ Integrate your windows and menus with Turb OS text windows. NEW?
 ◆ Create context-sensitive help screens; NEW?
 ◆ Provide multiple line edit fields with fully configurable edit (reys, NEW?
 ◆ Les vectorard and video screices
- (including enhanced keyboard and Vice) services

 ◆ Write TSRs and ISRs easily; ◆ Create powerful programs
 in Turbo C 10. L5 and 2.0!

FREE with these products!

Source code, complete sample programs, a comprehensive reference manual with extensive examples, the Norton Guides Instant Access Program, and an online database. We also offer free technical support and a bulletin board system dedicated to technical issues.

Unleash your programming potential!

Blaise Computing offers programming tools that are fast, flexible and affordable. Call now to order or to ask for a free brochure on our full line of products for C and Pascal

Put Blaise tools to the test!

If at any time during the first 30 days you are not completely satisfied with their speed and flexibility, we'll refund your money.

Call 800-333-8087 today!

BLAISE COMPUTING INC. 2560 Ninth St., Suite 316, Berkeley, CA 94710, (415) 540-5441 FAX: 415-540-1938



CIRCLE 116 ON READER SERVICE CARD

LANGUAGES

Turbo Pascal 5.0 word-aligns some variables—even if you tell it not to

Turbo Pascal 5.0 has the ability to wordalign (store at an even offset in memory) all variables larger than 1 byte. This can result in increased speed on 80286 computers. The [\$A±] compiler directive globally controls whether word alignment is on or it is off.

If a program makes assumptions about the relative addresses of variables, word alignment can throw it off. For example, programs that configure themselves by modifying typed constants within the EXE file usually assume those constants will be contiguous in memory. When your programs require that variables be contiguous, use {\$A-} to turn off word alignment.—Jason Destin; Miami Beach, Florida

The directive {\$A-} doesn't completely eliminate word alignment. The first variable in any VAR declaration is aligned on a word boundary, even when you've set {\$A-} and regardless of the variable's size. This can conceivably be a problem, because Turbo Pascal allows multiple VAR declarations. The program in Figure 2 demonstrates this effect. The first group of variables, XI, YI, and ZI, are all in the

same VAR declaration. Because word alignment is off, Y1 resides in memory immediately after X1. Variable Z1 is a word that overlaps both X1 and Y1, so making an assignment to Z1 affects both of the other two.

The second group differs only in that there is another VAR line between the X2 and Y2 variables. This makes a big difference, though. Variable Y2 is now also word-aligned, so it does NOT follow immediately after X2. An assignment to Z2 does NOT affect Y2. The WriteLn statements demonstrate this fact. To make things very clear, I fill the whole data area with SFF before the assignments.

Note that the demo program in Figure 2 is using byte variables. According to the manual, even with {\$A+}, Turbo Pascal 5 doesn't word-align variables unless they're larger than 1 byte. So this oddity could surprise you even with word alignment ON—Neil J. Rubenking

Make your text searches faster in BASIC without using assembly language

Microsoft's QuickBASIC compares integers more quickly than strings. Thus it is possible to speed up searching through string data by doing a hybrid search in

```
PROGRAM Alignment demo:
{$A-}
VAR
  X1 : Byte: Y1 : Byte:
  Z1 : Word ABSOLUTE X1:
VAR
  X2 : Byte;
VAR
  Y2 : Byte;
  Z2 : Word ABSOLUTE X2:
  dummy : byte;
BEGIN
  FillChar(X2, Ofs(dummy) - Ofs(X1), $FF);
  Z1 := $0101;
  22 := $0202;
  WriteLn('X1=',X1,' Y1=',Y1);
  WriteLn('X2=',X2,' Y2=',Y2, ' (Y2 should equal 2)');
  WriteLn('Note that the offsets below are all EVEN.');
  WriteLn('Offset of X1=',Ofs(X1));
WriteLn('Offset of X2=',Ofs(X2));
WriteLn('Offset of Y2=',Ofs(Y2));
END.
```

Figure 2: Turbo Pascal 5.0 always word-aligns the first variable of a VAR block.



OmniKey/102

FOR PC, XT, AT, 386 TYPE-SYSTEMS, IBM. AT&T, COMPATIBLES—Northgate designed Omnikey/102 in response to countless users who demand better layout, better touch and positive entry feel!

Northgate's OmniKey/102 is the standard by which all others are judged. Read why... "The feel of the OmniKey/102 is as close as

you're going to get to the IBM standard without having the real thing. -Donald P. Willmott, PC Computing

"...on a subjective 1-10 point scale of mush to well-defined feedback, I would rate the Compaq keyboard as a 1, an IBM keyboard as an 8, and a Northgate 102 keyboard as a 10."

-Burton L. Alperson, Andrew Seybold's Outlook on Professional Computing

"...12 function keys on the left where God intended them...revolutionary and much needed...Better than any replacement keyboard...duplicates the responsiveness and tactile feedback of the original IBM keyboard...A viable alternative to IBM's own model...durable, well-designed, sensible and has just the right feel..." -Gary Ray, PC Week



Features you'll find only in the OmniKey/102

- Exclusive Northgate Click/ Tactile touch using Japanese made ALPS sealed electro-mechanical key switches rated for virtually a lifetime of use.
- Three-Year UNCONDITIONAL WARRANTY. Anything breaks, we fix or replace free.
- LED light panel for CapsLock, NumLock and Scroll Lock (IBM doesn't have lights)
- ESC, CTRL, SHIFT, ALT keys are color coded Red, Green, Blue for
- WordPerfect® users. Vertical templates fit, too! Enter Key is jumbo sized. L-shaped, Backspace key is double-width. Both Shift keys are
- oversized for error-free operation.
- ESC key is where it belongs, next to No. 1 on the top numeric row.
- CTRL key is where you expect to find it, too, next to letter A. CapsLock key is next to space
 - 9 Curser and screen control keys
- Full Numeric Keypad AND
 WE'VE EVEN ADDED AN (=)
 KEY FOR FULL REDUNDANCY
 WITH TOP NUMERIC ROW. Spread sheet users and account ants love this feature. Built to last with full metal ha

with Compaq!

- (many keyboards are all plastic) OmniKey/IO2 has a solid 5.5 ib. "sit down on your desk to stay
- Pop-up back legs adjust typing angle for maximum comfort.

ORDER YOURS TODAY, Hurry, Supplies may be Limited!

NORTHGATE COMPUTER SYSTEMS, INC. 13895 Industrial Park Blvd., Suite 110 Plymouth, Minnesota 55441 Yes. Ship my OmniKey/102 order(s).

I understand I may use it for 10 days and if I wish, may return it for full product cost refund. I agree to pay for freight both ways. Compatibility Notes:

Requires standard 5-pin circular connector as on most IBM standard computers and compatibles

Northgate will accept COO and purchase orders from credit worthy buyers for quantities totaling \$50.00 or greater. For quantity prices phone our corporate headquarters 512-553-0734.

FAX orders to 612-553-1695.

* SHIPPING: Allow 5 days for order processing before shipment. Thereafter, shipments can be: 1) UPS Ground add \$7.00 ea.; allow 2-3 weeks for delivery.

2) UPS Second Day add \$12.00 ea.: 3) UPS Overnight add \$22.00 ea. Key/102 and Northgate are traduct uter Systems. All other product and tractematics of their manufactors.

1-800-526-2446 HOURS: MON-FRI. 8 A M -7

Name Company			_
Ship to (Address)			
City			_
Phone			
Computer Brand & Ty	ре		

OmniKey/102	\$ 99.00	\$	5
C/T 101	\$ 99.00	s	\$
C/T 84	\$ 79.00	S	\$
AT&T 6300	\$124.00	\$	S
PS/2 Models (add for ea.)	\$ 25.00	s	s
* TOTAL OF O	RDER		S

Prepaid amount enclosed \$	_	
Please charge to my Visa		MasterCard Accoun
Card No.	_	Expires

Signature of Cardholder re authorizes a charge to my account for the above se prior to shipping to initiate processing of my order.)

Virtual Memory for DOS!

MicroWay is your best source for the software and hardware you need to get true 32 bit performance from your 386. These include 32-bit tools, such as NDP Fortran and C, and the 32-bit applications that were developed with them (see last paragraph). These products run in protected mode under Unix, Xenix, or Phar Lap extended MS-DOS.

Starting with release 1.4VM, NDP Fortran and C not only access 4 gigabytes of memory, but run with Phar Lap's new VMM extension which provides 386 protected mode virtual memory. Now you can run a program with a 30 MB array on a 2 MB system simply by having 30 MB of free space on your hard disk.

MicroWay also offers transputer based parallel processing boards and languages that run in an XT, AT, or 386. Each of the T800 RISC processors on these boards packs the power Dr. Robert Atwell, leading defense scientist, calculates that NDP Fortran-386 is saving him \$12,000 per month in rentals of VAX hardware and software while doubling his productivity

Fred Ziegler of AspenTech in Cambridge, Mass, reports, "I ported 900,000 lines of Fortran source in two weeks without a single problem!" AspenTech's Chemical Modeling

System is in use on mainframes worldwide and is probably the largest application to ever

Dr. Jerry Ginsberg of Georgia Tech reports. *My problems run a factor of six faster using NDP Fortran-386 on an mW1167 equipped 386/20 than they do on my Micro VAX II."

of a 20 MHz 386/1167. Our best selling board, the Quadouter2™, has four T800s and boasts 40 MIPS/6 megaflops of processor throughout.

MicroWay manufactures Weitek 1167 and 3167 coprocessor cards that run with the 80386. Both cards include an 80387 socket. The 1167 is 2 to 4 times faster than the 80387. The 3167 runs 30% faster than the 1167 in double precision. The key to achieving this speed increase is our NDP Fortran or C and the new 32-bit applications that offer Weitek support. Either processor provides a dramatic increase in throughput for graphics intensive applications. These include VersaCad and loops 3D graphics, ANVIL 5000 CAD/CAM, SRAC and Swanson Analysis finite element packages, Mathematica and a host of other packages that were recently ported to the 386 using our NDP Fortran and NDP C. Please call (508) 746-7341 for more information.

32-Bit Compilers and Tools

NDP Fortran-386™ and NDP C-386™ Com pilers generate globally optimized, mainframe quality code. Both run in 386 protected mode under Unix, Xenix or Phar Lap extended MS-DOS. The memory model employed uses 2 segments, each of which can be up to 4 gigabytes. They generate code for the 80287, 80387, mW3167 or mW1167. Both include high appead EGA graphics extensions written in

C that perform BASIC-like screen operations.
. NDP Fortran-386™ Full implementation of
FORTRAN-77 with Berkeley 4.2 and
Fortran-66 extensions\$595
• NDP Fortran-386/VM\$695
• NDP Fortran-386/UNIX \$795
. NDP C-386™ Full implementation of AT&T's
PCC with MS and ANSI extensions\$595
• NDP C-386/VM \$695
• NDP C-386/UNIX
Dharton Decomest automican are accounted

Pher Lap 386/VMM extensions are supported by the VM releases of NDP Fortran and C. Virtual memory is used automatically by the compilers and the code they generate. This makes it possible to compile and run programs as large as the free space on your hard disk.
Phar Lap Virtual Memory Manager .. \$295
Pher Lap Development Tools\$495

NDP Windows™—NDP Windows includes 80 functions that let you create, store, and reca menus and windows, It works with NDP C-386 and drives all the popular graphics adapters
Library: \$125. C Source: \$250

NDP Plot™ -- Calcomp compatible plot package that is callable from NDP Fortran. It includes drivers for popular plotters and printers. Works with CGA, MDA, EGA and VGA...\$325

NDP/FFT™ - Includes 40 fast running, hand NDP/FFT'" — Incudes 40 last running, name coded algorithms for single and double dimen-sioned FFTs which take advantage of the 32-bit addressing of the 386 or your hard disk. Callable from NDP Fortran with mW1167 and 80387 support \$250

NDP to HALO '88 Graphics Interface — This module enables you to call graphics routines in HALO 88 from NDP Fortran or C......\$100

MicroWav® 80386 Support (508) 746-7341

Parallel Processing

Videoputer™

The highest performance graphics card on the market. Uses a T800 and TI 34010 in conjunction with a 130 MHz BrookTree DAC. board comes with one meg of system RAM, one meg of video RAM and a library of graphics primitives. It runs standalone or in conjunction with a transputer network and drives 32 and 64

Monoputer2™

The world's most popular PC transputer development product now extends the memory available for developing transputer applica-tions from 2 to 16 megabytes. The board fea-tures a DMA bus interface for fast I/O. Monoputer2 with T414 (0 MB) \$995

Monoputer2 with T800 (0 MB) \$1495 Quadputer274

This board for the AT or 386 can be purchased with 2, 3 or 4 transputers and 1 or 4 megabytes of memory per transputer. Two or more Quad-puters can be linked together to build networks of up to 100 or more transputers providing mainframe power from \$3495

Transputer Compilers and Applicationa
These Parallel languages are designed for use
with Monoputer2 and Quadputer2.

Performance Monitor . . C Source Level Debugger \$500

T800/NAG™ (See NDP/NAG) ...

387BASIC™ — Our 16-bit MS compatible compiler introduces numeric register variables to produce the fastest running 80x87 code on

Weitek-Based Coprocessor Boards

mW1167™ and mW3167™ coprocessor boards are built at MicroWay using Weitek components. Each includes an 80387 sock mW1167-20 \$1095 mW1167 Microchannel-16/20 CALL 2167-20 \$995 3167-25 mW3167/80387 Board\$150

Intel Coprocessors and RAM

B087-2 .																						\$1	20	
80287-8						į	Ĺ		ì			Ĺ	i	ì								\$1	95	
80287-10				î	0				0	0		0	1	0			•	Ĩ	Ī	•	Ť	\$2	20	
80C287A	(C	M	×	i													•	•	ľ	•		\$2	ลัก	
80387-16	,		_	٠,		•	•	•	•	•	•	•	•	•	٠	•	•	•	•	•	•	ě	50	
80387-16	٠v		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	90	÷	
00307-10	3,		• •	٠	٠	•	٠	•	٠	•	•	•	•	•	•	٠	٠	٠	٠	٠	•	*	10	
80387-20		• • •	• •	٠	٠	٠	•	•	•	•	٠	•	٠	٠	٠	•	٠			•	٠	34	w	
80387-25	11			٠	ċ	٠	٠	٠	٠	٠	٠	٠	:	٠	٠	•	÷	٠		٠	•	\$5	00	
287Turbo	-12	2 (1	O	۲,	A	Ī	9	×	×	n	P	a	b	D	e	6)			٠	:	\$3	50	
RAMpak ¹	-	11	n	B	g	3	2	•	b	ıt	П	n	8	m	C	ς	y	П	n	×	đ	ule		
or Compa	aq s	BYE	t	91	n	t	n	e	П	ĸ	1	y	ŧ	×	ì	U	d					\$6	50	
256K 100	กล	DI	₹/	١	и																1	CA	ᄔ	
256K SIM	MS	3,																			1	CA	LL	
LUD CIL	MS																				4	-		

(All of our Intel coprocessors include 87Test.) Multi-User Accelerators

MicroWay's AT8™ and AT16™ Intelligent serial controllers run 8 to 16 terminals under Unix or Xenix without bogging down your AT, 80386 or PS/2 PC. AT8: \$995 AT16: \$1295

32-Bit Applications

PSTAT-386 - Popular maintrame statistics package. Full version was ported \$1495 NDP/NAG™ — Features a library of 268 engineering and scientific numerical algorithms.
Callable from NDP Fortran\$895 Call for our list of new 32-bit applications.

12 MHz PC Accelerators

FaatCACHE-286 12 MHz . SuperCACHE-286 12 MHz FastCACHE-286 9 MHz



World Leader in PC Numerics

Corporate Headquarters: P.O. Box 79, Kingston, MA 02364 USA (508) 746-7341 32 High St., Kingston-Upon-Thames, U.K., 01-541-5466 USA FAX 508-746-4678 Australia 02-439-8400 Germany 069-75-1428

■ LANGUAGES

```
DEFINT A-Z

FOR i = 1 TO n

IF swarch$ = array$(i) THEN

PRINT swarch$; " found at element"; i

EXIT FOR

END IF
```

Figure 3: The conventional way to search a string array in BASIC, while effective, is slow.

```
DEFINT A-E = ASC(mearch);
FOR i = TO
FOR i =
```

Figure 4: An improved search method tests with ASC() to speed up string searches.

which the ASCII value of the string is used first as a precursor to a full comparison. The standard way that you search through a string array is by comparing each element directly, as in the program fragment STRING1.BAS, shown in Figure 3 above.

A much better approach is given in STRING2.BAS (Figure 4), which can perform as much as 60 percent faster as STRING1.BAS. The improvement will not be noticed unless the program is compiled to an .EXE file.—Norman Swarz; Burnaby, British Columbia, Canada

String operations are one of the slowest things that QuickBASIC does, and checking the ASCII value of each element does indeed quickly weed out those strings that couldn't possibly match. Be aware that both of the methods shown are case-sensitive, which means that searching for Smith will not find SMITH or smith.—Ethan Winer.

Speak Your Language

Share your knowledge of BASIC, C. Pascal, FORTRAN, and COBOL with Languages readers. We'll pay you \$50 or more for any tips we print, plus an extra \$25 if you submit your letter on-disk. Please include a printed copy. Mail contributions to Languages, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Productivity Section).

HARD DRIVES

INTERNATIONAL

MiniScribe



Card Drive™

Card Drive 20-8225 68ms \$279 Card Drive 30-8438 68ms \$309 Card Drive 40-8450 46ms \$359

These Card Drives use quality MiniScribe drives.

-- Features --

-Available for PC/XT and most Tandy models.
-Quality engineered for reliability.
-Auto lock feature.

ONE YEAR Warranty.
Super easy installation and setup.

Super easy installation and setup.
 Pre-formatted, Pre-tested and READY TO GO!

PC/XT KITS

Seagate

20Mb	ST225	half ht.	65ms	\$244
30Mb	M8438	half ht.	65ms	\$279
40Mb	M8450XT	half ht.	46ms	\$319
62Mb	M3675	half ht.	61ms	\$379
80Mb	ST251/PS180	half ht.	40ms	\$499
130M	b M6085/PS18	0 full ht.	28ms	\$699

ALL KITS COME COMPLETE...
with drive, controller, cables, How-To Manual
and mounting hardware. 40Mb and larger drives
also include partitioning software.

SP DAY
"WORRY FREE"
GUARANTEE

"YOU GOT THAN IT
RETURN IT
REFUND

FACTORY-TRAINED TECHNICIANS are on hand to answer your

AT/386 DRIVES

ALL DRIVES include AT mounting hardware and "Disk Manager" formatting/partitioning software!!

40Mb Seagate ST251-1 half height 28ms \$399 71Mb MiniScribe M6085 full height 28ms \$539

Hard/Floppy Controller!

Call

Toll Free

ONE YEAR Warranty on all products!





HARD DRIVES
International
An IDN Company

1912 W. Fourth St. Tempe, AZ 85281 (602) 967-7435 VISA

TELEX: 405765 FAX: (602) 829-9193

TELEX: 405765 FAX: (602) 829-9193

South American Distributor: Hardware Express
Avenue Lais Trayer Ojods 01151-10

Phone (562)-2311144 FAX (562)-2233664

International Orders: (602) 784-1038 Order Status: 1-800-234-5197

change without notice. All tiens of NEW 5% successing for Amelican prise and COD orders. P.O.'s excited from queffed buyers. Add strapping for EUPESS APO/IFFO one 30 Day Guorantee constitions of page 8 investing change in mat refus

Never a Surcharge for Visa or Master Card

SAME DAY SHIPMENT. GUARANTEED*

Yes, we can ship your system today! We've built an extra supply of our most popular selling Complete 12 MHz, Zero Wait State, 32MB Hard Drive systems.

These are complete, genuine ZEOS 12/0 Systems. They include a high speed 32 MB Seagate hard drive and all the other goodies. And they're ready to ship. Right Now!

Here's how it works. We have these extra systems prebuilt and ready to ship. They include both High Resolution Monochrome and ECA systems. While supplies last, we will ship either of these systems to you the day you order subject to these conditions:

- Your order must be received by 1PM Central Time.
- Credit Card orders are subject to credit card authorization.
- 3. Orders must be for our standard 12MHz Monochrome or EGA systems. Other systems or upgrades are custom built and will take slightly longer.



NOW! BY ZEOS

COMPLETE 12MHz, ZERO WAIT
286 SYSTEM WITH 32MB
HARD DRIVE!
Complete Monochrome
32 MB Hard Drive System
ONLY \$1,395
Complete EGA Color
32 MB Hard Drive System
ONLY \$1,890

***OUR GUARANTEE TO YOU:**

If we fail to ship your system under the conditions outlined we will ship it at our expense as soon as it is ready. All systems are fully burned in and tested. Each system includes our 30 day Money Back Guarantee and One Full Year Limited Warranty.

This offer is good only as long as these pre-built systems remain in stock; please give us a call to verify availability. This offer does not apply to other ZEOS systems or custom configurations.

FREE SHAREWARE DISKS TOO! 25 Software Programs Included.

Every system will include 25 ready to run Shareware programs on 5 free disks. Included are programs for Word Processing, Spread Sheets, Educational, Financial, Business, Games and more. With Shareware you can try the programs first before you register them with the author. What a great idea!

STANDARD FEATURES INCLUDE:

- High Res 12" Amber Display with Tilt and Swivel Base. Compatible graphics controller. EGA optional.
- 80286-12 CPU, 6/12MHz Dual Speed, Keyboard/ Hardware Selectable.
- Zero-Wait State DRAM, 512K expandable to 4MB on the motherboard (16MB System Total).
- Fast 32MB Seagate 138R Hard Drive with auto-park, 1.2MB Floppy Drive.
- Ultra high speed Hard/Floppy controller. 1:1 interleave, 800 KB/sec transfer rate.
- ZEOS/RS 101 Enhanced Keyboard, Pleasant Tactile/ Click Feel.

- Serial and Parallel Printer Ports.
- Clock/Calendar with Battery Backup.
- 6-16 and 2-8 bit expansion slots. 80287 support.
- Space Saver Case with Security Lock, LED indicators.
- 30 Day Money Back Guarantee. Full One Year Limited Warranty.
- Many other options available. Call for details.

ORDER NOW TOLL FREE 800-423-5891 FAX Orders Diel: 612-633-2310

X Orders Dial: 612-633-2310 Minnesota Call: 612-633-4591 asterCard, VISA and COD pen days, evenings and weekends.



Prices do not include freight, are subject to change without notice and may be subject to a memory surcharge. COD orders may require an advance deposit. Call for current prices and warranty details. ZEOS is a publicly traded company, MPLS St. Paul Local OTC. ZEOS International, Ltd., 500 5th Avenue, N.W., St. Paul, MN 55112 © 1989

PC TUTOR



Preventing batch files from ending prematurely; examining large files with DEBUG; interpreting PCMAP's output; producing the ESC character you need for ANSI commands.

The output of the PCMAP program can be confusing

When the BASIC program for PCMAP appeared in the August 1987 PC Lab Notes column, I keyed it in and created it. I have used the program to find what is in memory a number of times. But recently, I tried to use it to find why Quattro said I had only 107K of memory free. It was then I found that PCMAP gives budicrous results.

Figure 1 shows a printout of the PCMAP results. PCMAP gives CA and C8 as the length of COMMAND.COM and IDEE as the length of PCMAP!

In all honesty, I am not writing to complain but to inquire whether you have a revised version of PCMAP. It's possible that I may have overlooked a printed correction.—R. Clark Jones; Cambridge, Massochusetts

As strange as the results may seem, there's nothing wrong with PCMAP. Because it's such a small utility and there isn't a lot of code spent on making the display pretty or easy to read, it may take some explanation to make sense of the numbers.

First, all the numbers listed are in hexadecimal and may have to be converted to decimal to make sense. The first column, "Segment," is the segment of the program that owns the memory. This is also called the Process Identifier (PID).

The second column, "Paragraphs," gives the total number of paragraphs of memory allocated to this PID. A paragraph is 10h (16) bytes, and this number

includes the program block, environment block, and any other memory the program may have allocated.

The third column gives the name of the program if available. The name is maintained only by DOS 3.0 and later and can be obtained—unless the program releases its environment block when it's loaded, as some memory-resident programs do.

The first entry in Figure 1 lists the size of COMMAND. COM as CAh paragraphs. This is 3,232 bytes, and it represents the size of the resident portion that COMMAND. COM leaves in memory when running another program. DISK-LITE. COM is a memory-resident program. Another program (unknown) is also memory resident.

The program TURBO. EXE is in memory, and it occupies 32F2h paragraphs, or 208,672 bytes. From this program, you invoked a second copy of COMMAND. COM, which was loaded into memory. You then executed PCMAP. This caused

COMMAND.COM to release all but C8h paragraphs of itself (3,200 bytes) and run PCMAP.COM. Because. COM programs are allocated all memory when they start, PCMAP is shown as owning I DEEh paragraphs (122,592 bytes).

A bug in the IBM PC-XT BIOS causes some video routines to return incorrect values

I'm having trouble understanding the ROM BIOS video function 3, Read Cursor Position. When I boot my IBM PC-XT with a monochrome display, the cursor is obviously at scan lines 11–12. But the Read Cursor function tells me the cursor is sitting at scan lines 6–7. On returning to DOS after executing BASICA, the function properly reports scan lines 11–12. But returning to DOS after running my editor has Read Cursor reporting lines 6–7 again.

What's causing the Read Cursor func-

PCMAP 1.0 (c) 1987, Ziff-Davis Publishing Corp.

4C22 4CEE 4CF8 4DØD 4D13 4E5C	Paragraphs 00CA 0003 0019 0005 013F 32F2	Program COMMAND.COM (Free) DISKLITE.COM (Free) (Unknown) TURBO.EXE
4E5C	32F2	TURBO.EXE
8150	00C8	COMMAND.COM
821A	1DEE	PCMAP.COM

Figure 1: The output from the PCMAP program displays the programs in memory and the amount of memory they are allocated. As strange as they seem, these results are correct.

■ PC TUTOR

tion to get its data from something other than the actual cursor? None of this happens on my IBM PC-XT/286.—Barry Gordon; New York, New York

The IBM BIOS in your model of IBM PC-XT has a bug that causes it to perform exactly as you describe. The BIOS sets the cursor registers that control the cursor shape correctly for the Monochrome Display Adapter (MDA), but it sets the BIOS data area in low memory to reflect a Color Graphics Adapter (CGA) cursor.

This problem was fixed in later versions of the BIOS, as you observed. Installing an EGA or VGA will also solve the problem since these cards carry a replacement video BIOS.

Three ways to produce the ESC character for sending commands to the ANSI screen driver

Can you explain how I can create the '[escape sequence on a Compaq Portable I computer? A friend showed me how to use it to reverse the video, change the screen colors, and so forth. I've installed the AN-SI.SYS device driver in my CON-FIG.SYS file, but I still can't produce the correct character.—Cifford N. Nelson; Herndon. Virnina

The ESC character can be produced in a number of ways. Unfortunately, pressing the Esc key is not one of them. You can use BASIC to issue the ANSI command that clears the screen by entering and running

10 PRINT CHR\$(27)+"[2J"

The BASIC function CHRS is used to produce the ESC character, which has a decimal value of 27. The ESC character, followed by a left bracket, is the ANSI command prefix. The 2J is the ANSI instruction to clear the screen.

If you have a text editor that allows all characters to be entered, you can write ANSI control strings directly into your batch files. PC Magazine's TED.COM, which appeared in the November 15, 1988, Utilities column, allows the ESC character to be entered directly into text files.

Finally, the small utility ESCAPE

.COM was published in the January 31, 1989, Utilities column along with our replacement for ANSLSYS. This small program solves the problem of entering escape sequences at the DOS prompt.

The BAC.COM utility won't copy very large files

The BAC program on your PC Utilities disk has the potential of being a great program—but I can't make it work.

I'm trying to copy a very long file from my hard disk to a 1.2MB floppy disk. BAC works if the file to be copied is less than one floppy disk long. Otherwise, the

■ TED.COM allows the ESC character to be entered directly into text files.

program keeps prompting you to enter a new disk, even if two disks would be enough. When I check the disks it makes under these conditions, there are no files on them at all. Any suggestions?—Holton E. Harris; Westport, Connecticut

The BAC program (Utilities, August 20, 1985) employs a very simple algorithm: if the size of the file to be copied is larger than the amount of free space on the target disk, ask for a new disk. So attempting to BAC a file that is 1.4MB, for example, to a 1.2MB drive is doomed to failure. No 1.2MB drive will ever have 1.4MB of free space. BAC also does not split files across disks. Therefore, no file that is larger than the size of the target disk can be copied.

The DEBUG program can be used to examine data files that are larger than 64K

In PC Tutor, September 27, 1988, you discussed the DEBUG program. This brought to mind a problem I have had examining some large data files with DEBUG. It seems that DEBUG can display only the first 64K of a file. Is there any way I can look at the part of a file that exceeds 64K?—Dan Kubala; Chicago, Illinois

DEBUG can be used to examine large files, but it requires a little manual intervention and math on your part. The D (dump) command in DEBUG displays the contents of memory. If you specify a starting address (D 12A4, for example) the dump starts at this address. If not, the dump starts at the end of the previous dump or 100h if it's the first dump. If you specify only an offset, the dump uses the value of the DS (data segment) register for the segment. Unless you specify a segment in the dump command (D F334:1023, for example) or change the value of the DS register, you are limited to examining 64K

To see more of the file, you must add 1000h to the segment. If, after loading the file, DS=1456, entering

RDS 2456

will change DS to point to the second 64K of the data file. Alternatively, you could simply specify the segment by entering the command

D 2456:0

to display data after 64K.

Note that this technique won't work with .EXE files. Parts of these files are relocated in memory when they are loaded and are not pointed to by the DS register.

How to prevent some programs from ending batch files prematurely

I like to use DOS batch files to create menu systems, I create my menu screen display using the command TYPE MENU.TXT in my AUTOEXEC.BAT file and at the end of each batch file that executes a program. This works most of the time, but not always.

Often, after the program that's selected by a batch file ends, the command prompt is displayed instead of executing the remaining commands in the batch file. Is there any way to avoid dropping to the

AccountMate O PLUS IV. Business Accounting Software Designed for Change.

AccountMate

AccountMate 2.0 PLUS IV. Designed to Run Quickly and Efficiently on dBASE IV While Maintaining Compatibility With dBASE III*

Use our powerful, full-featured library of account ing programs as they are, or take advantage of AccountMate's free dBASE® source code and modify them to meet your business needs.

AccountMate grows with your business. Each menu based AccountMate module can fully integrate or stand alone. Add more program modules as you need them. AccountMate is also compatible with most popular spreadsheet programs.

Authorized AccountMate consultants are available throughout the U.S. and Canada for dBASE program modifications. Our Clipper™-compiled version runs without dBASE.

Call today and find out how productive you can be with the software solution, designed for change.

"An easy-to-run, full-featured system with excellent documentation and performance." PC Magazine

Manufacturing

AccountMate Modules: • Payroli General Ledger · Accounts Receivable

Sales Order

- . State Tax • lob Cost
 - Toolbox

800-877-8896

SourceMate[®]

We Produce Solutions.

20 SUNNYSIDE AVENUE, MILL VALLEY, CA 94941-1928 415-381-1011 TELEX: 510 600 5270, ACCOUNTMATE FAX: 415-381-7451

dBASE III and dBASE IV are trademarks of Ashton-Tate. Inc. SourceMate. Account Mate 2.0 FLUS IV, Toolbox, Transformer and SearchMate are trademarks of Source

CIRCLE 227 ON READER SERVICE CARD



Has heat destroyed your hard disk and all your valuable data? Are you faced with changing out a hard disk soon...due to bearings failing? Well, join the club! Heat is a cancer to hard disks that will sooner or later destroy them. The new technology

disks all produce more heat than desired and many of them will suffer an early death in the confines of your PC system chassis.

The PC DISKSAVER sits below your half height disk drive and cools it 30+ degrees, while operating from your current power supply. The actual life span of your hard disk may increase by several years. The PC DISKSAVER comes in three models and installs easily in any IBM PC, XT, AT, compatible or clone and comes with full instructions.

Order your PC DISKSAVER today. \$39 95

Toll Free (800) 223-9758

In Montana call (406) 777-5511

American Technology Labs

Dealer Inquiries Welcome-Patent Pending

laser printer and another printer or photoe SMMTAMENUSY SOFT CODE COMMAND TOWNER SOFT CODE OF RET HOW SET OF THE SOFT OF · ONE YEAR WARRANTY ERMANCE TRANSMISSION DISTANCE. REMANUE TRANSMISSION DISTANCE IS NEEDED. FRY TO LIVE NO SOFTWARE IS NEEDED. FRY TO LIVE NO SOFTWARE IS NEEDED. Share You Laser Printer with our MASTER SHARE 2 inputs to 1 output We also other: 2 inputs to 2 outputs 4 inputs to 1 output iputs to 1 output 256K, 512K or 1 Medic byte memory Call: (213)542-0788 TORRANCE CA 90503 CIRCLE 217 ON READER SERVICE CARD

■ PC TUTOR

prompt? Why does this happen?-Roger Chalonec: Virginia Beach, Virginia

What a program does when it runs and how it returns to DOS can affect the way a batch file is executed. If a program executed by the batch file encounters a critical error, such as attempting to read from an empty disk drive, and the operation aborts, the batch file processing may not be continued when control returns to DOS.

 DEBUG can be used to examine large files, but it requires a little manual intervention on your part.

One method of minimizing the risk of early termination is to insulate the execution of troublesome programs from the parent batch file by executing them with another copy of COMMAND.COM. For example, if the program GOLFER is causing problems, try these batch file commande.

COMMAND /C GOLFER TYPE MENU.TXT

Note, however, that using this extra copy of COMMAND.COM will reduce the amount of memory that GOLFER has to execute in, but all the memory will be freed when GOLFER terminates.

Ask the PC Tutor

The PC Tutor solves practical problems. explains points of general interest about using your hardware and software more productively, and answers basic questions about DOS and systems in general. To have your questions answered here, write to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Productivity section). We're sorry, but we cannot answer questions personally.

No matter which of these modes you use,

40-column CGA Text 40-column EGA Text 40-column VGA Text 80-column CGA Text 80-column EGA Text 80-column VGA Text Lo-res CGA Graphics Hi-res CGA Graphics MDA Monochrome Text 80-column VGA Monochrome Text Lo-res MCGA Graphics Lo-res VGA Graphics Med-res VGA Graphics EGA Monochrome Graphics **Hi-res EGA Graphics** Hi-res MCGA Graphics Hi-res VGA Graphics

we have the VGA display for it.



Magnavox introduces two new Professional Series displays that are fully compatible with all 17 VGA modes—both designed with the intelligence you've come to expect from Magnavox.

With a VGA display system, you'll get the most out of your present software and prepare yourself for graphics environments like Windows 386, OS/2;**and Presentation Manager.** Resolutions include 720 x

400 for text, and 640 x 480 in 256 colors for graphics.

Both displays have a 14" CRT, versus the 12" industry standard. And both come with a built-in tilt/swivel base and are backed by a 2-year limited warranty—twice as long as most other brands.

At \$229 for the 7BM749 paper-white monochrome and \$649 for the 9CM082 color display, Magnavox makes VGA displays affordable.

MAGNAVOX Smart. Very smart.

All these programs







Quantum



ACTIVISION













have one thing in common:

DeskMate!

The proven, user-friendly interface

Good news!

Now there's a software system designed to make your PC-compatible computer easier to use than ever before. It's the DeskMate® Graphical User Interface, which leading software publishers are adopting to give their programs a friendlier look and feel.

This new interface gives you a welcome uniformity in operation. It's easy to move from one program to another, and learning new programs is a snap. Now, instead of spending time learning the peculiarities of a new program, you'll be getting more out of your computer!

How does it work?

Very well, thank you. The proven format of the DeskMate Interface uses pop-up dialogue boxes and handy pull-down menus to select operations. Function keys work similarly from program to program. Bold graphics make it easy to see what you're doing—move around freely and make selections with the keyboard, or use a mouse for "point and click" convenience.

Look at what's available.

When you learn to use one program that uses DeskMate standards, you're well on your way to knowing how to use a library of software. Choose from great titles in everything from word processing and accounting to desktop publishing and home education. And whether you own one or a dozen DeskMatebased programs, you'll appreciate the DeskMate difference in ease of use.

Make it easy on yourself.

Join the revolution that's setting new standards in user friendliness. Look for programs with the DeskMate logo! Also available: the software package that started it all!

Discover the ease of use of the DeskMate User Interface with DeskMate Applications



Software, a versatile collection of ten great programs. You get word processing, spread-sheet, communications, database, graphics and more. Available at leading software dealers nationwide.

CIRCLE 264 ON READER SERVICE CARD





Remote locations with a lot to say need Sync-Up V.32

If you have a high-volume communications requirement between your mainframe, mini or micro and your remote locations, Universal Data Systems is ready with the answer. Sync-Ub V32 is a single-board

Sync-Up V.32 Is a single-board

emulator/modem that plugs directly into an expansion slot; no external cabling or equipment is required. It is a *true* V.32, compliant in every respect with the CCITT recommendation.

The modem half of the device moves data over ordinary dial-up telephone lines at 9600 bps, full duplex! You can choose an emulator that supports SNA (3270, 3770 or 5251) or BSC (2780/3780 or 3270).

Bring your remote outposts into the mainstream of your data communications system. For detalled specifications and prices, contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/721-8000; FAX 205/830-5657.



Universal Data Systems



CONNECTIVITY CLINIC



Shortcuts for loading NetWare drivers for new networking cards; combining operating systems on the same cable is easy; replacing a minicomputer with a LAN.

Today's LAN can replace a minicomputer

PC Magazine has carried articles on big, fast 386 machines, on networks, and on networked databases. What happens when you put the pieces together? Have networked PCs advanced to the point where they can effectively replace a minicomputer?

The association I work for, which serves 55,000 members, would gladly unload its expensive HP 3000 system if a 386-based system could handle 12 active terminals, eight interrelated databases, about 1.5 gigabytes of data on-disk, and a couple of high-speed printers.

Should I call the Compaq, Novell, and Clarion dealers or expect to pour money into the mini for a few more years? —Henry S. Noble; Gaithersburg, Maryland

Today's LAN hardware and software can do the job for you, but there are some important things you should consider before calling Hewlett-Packard to come and take away its iron. Let's take your requirements one by one.

Twelve active terminals and two printers are no sweat. Three factors are important in delivering service to the terminals: the efficiency of the networking software, the speed of the server's hard disk drive, and the efficiency of the network interface cards. I would use an ALR 386/220, a Compaq 386, or an IBM PS/2 Model 80 as the server. Use ARCnet, Ethernet, or

Token-Ring network interface cards (my preference, in that order) and invest in one high-quality network interface card with a 16-bit or Micro Channel interface for the

The configuration of your 1.5-gigabyte datafile is important in selecting your networking software. Novell's SFT NetWare, for example, can handle only a maximum volume size of 255MB. You can put up to eight hard disk controllers in a NetWare server, and each controller can handle two drives; so you can get plenty of storage, but it is not contiguous.

You can get more contiguous storage (theoretically up to 4 gigabytes) out of 3+Open running over 052, but you will probably have to arrange the drive with very large clusters that make for inefficient storage.

Frankly, I see developing the database structure as the most complex job that you will have to face. You should take plenty

■ Two advantages of replacing a minicomputer with a LAN are a lower life-cycle cost and a wide variety of applications to choose from.

of time and get the application right before you give HP the old heave-ho.

The major advantages you will enjoy by replacing your mini with a LAN include lower life-cycle cost, a wider variety of applications to choose from, and more flexible solutions to future connectivity opportunities. The disadvantage is a slightly more complex environment for database applications and for backing up distributed data. Go for it!

Receiving an unexpected interrupt is a nasty surprise

I use dBASE III Plus on a Tandy 3000 that has a PC slave card and runs on a NetWare-compatible LAN. My terminal is a Kimtron. Almost every day I get a program lock, and the Tandy reports "unexpected SW interrupt please press (Ryeboot." Is it possible that my Tandy can't handle the traffic of the LAN, or are the PC slave board and NetWare-compatible LAN by Alloy the problem? And what's the solution?—Jay Stockman; East Rockaway, New York

I ran the Alloy PC-Slave/286 under NetWare and didn't find the problem you described in you letter, but I did encounter it on a plain IBM PC AT. Alloy hasn't certified its drivers on the Tandy 3000, and the error message you report comes from the Tandy BIOS.

The amount of traffic isn't the problem, but small incompatibilities between the three busy software systems (Alloy driv-

CONNECTIVITY CLINIC

ers, Novell's NetWare, Tandy's BIOS) probably are. My first suggestion is to get rid of any TSR programs you have loaded on the Alloy CPU. Also call Alloy and make sure you have the latest version of its driver software-it should be Version 1.01 or later. I wouldn't be surprised if the problem happens when the printer or serial I/O ports are in use on the server. Isolate as many functions as possible to try to find the combination of functions that hangs the operating system.

Mixing operating systems on the same cable is no problem

In Connectivity Clinic, June 28, 1988, you discussed mixing operating systems on an Ethernet network. Can I simultaneously run 3+Share and NetWare on a single Ethernet wire if two servers are attached? -David Solomon (via CompuServe)

Yes, you can simultaneously intermix NetWare and 3+Share server operations on the same Ethernet cable or even on the same Token-Ring or ARCnet cabling. The packets or tokens know where they are going and how to traverse the cable regardless of the configuration of the data load they carry.

Even more interesting, if the different workstations are all running NetBIOS or NetBIOS emulation, they can use the same SNA, X.25, fax, or other gateways attached to the cable. The terminal emulators or communications drivers operate independently of the networking software and servers.

The differences among LAN software in the workstations are starting to disappear. Right now you can run the same workstation software for 3+Open, IBM PC Local Area Network Program, IBM Server Manager, and other versions of LAN Manager, Version 2.15 of NetWare

will let you run AppleShare workstation software in PCs or Macs in place of the NetWare shell. As the major companies bring to the market products that support IBM, international, or de facto standards, workstation and cabling differences will disappear quickly.

Loading NetWare drivers for new networking cards is easy

l enjoyed your recent review of Ethernet cards, but not many of the cards you reviewed have drivers included in the Novell NetWare installation menu. I would like to know how hard it is to install the drivers for new cards that aren't already in the menu Novell ships with NetWare .- Bill Loftiss; Peru, Indiana

NetWare comes with many drivers, but there are still more card manufacturers that

More Power For

No single word processor is perfect for all of your users.

Two Fingers Tommy needs a different approach than Blazing Fingers Terry and that's where WordStar fits in. WordStar is the Touch Typist's Word Processor.

The Touch Typist's Dilemma

WordStar understands your touch typists' dilemma. You need them to produce good looking business documents and correspondence fast. But they don't have the office's most powerful computers. For these users WordStar's compact size and home row commands make it outperform general purpose function key word processors every time. Touch typists can edit, format, layout, and preview documents much faster with WordStar than with hunt and peck function key word processors.

On the other hand, users in

your department who aren't touch typists might be better off with a function key word processor. Constantly looking at the keyboard doesn't seem to distract non-touch typists.

WordStar Does Best What Your Touch Typists Do Most

WordStar 5 is the latest release of The Touch Typist's Word Processor.



send drivers with the network adapters. In the recent Ethernet review, we tested 11 Ethernet cards, and nine of the 11 companies sent their own driver programs for NetWare. Each company included instructions in its documentation on how to install the drivers. But after reloading NetWare dozens of times, here are the shortcuts we worked out.

If you don't find the LAN driver you need in the NetWare menu selection, use an ASCII editor to read the LAN driver sent by the manufacturer. Look for the text string LAN_DRV_NNN (where NNN represents any number), change the NNN to 001, and save the changes. Move the changed LAN file for Version 2.1 of Novell's NetWare to the Auxgen and Shgen-1 diskettes. Move the object code (these are the files with .OBJ extensions) to the LAN DRV 001 disk. This is all that's needed to display the correct LAN driver in the NetWare menu.

Find a fast machine to link the operating system with the LAN driver and disk driver. The machine you use for linking can be different from the machine that will finally be the server. If you install a new driver in an existing Novell operating system, always choose the Advanced System Configuration or the Install with Custom Options menu. If you chose the default options, you'll get a workout exchanging disks in the floppy disk drive, but you won't have to work through every menu option. If possible, use a computer with two floppy disk drives to create the operating system-it makes life a lot easier. The final installation of the operating system must be done on the server that's running NetWare.

If you are modifying an existing operating system, make a backup copy of the old Osexe-1 and Osexe-2 disks. These disks contain the final object code for the operating system. Save the old copies of the

Osexe disks just in case you need the old version or there is something wrong with the new operating system.

Network Your Ouestions

Connectivity Clinic gives you practical solutions to networking problems of all types. We'll pay \$50 or more for any tips we print, plus an extra \$25 if you submit your letter on a disk. If you do, please include a printed copy. We'll gladly answer your questions at no charge, but we cannot answer letters personally. Mail contributions to Connectivity Clinic, PC Magazine, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (to ioin, see the "By Modem" sidebar in the Productivity section). You may also contact Frank J. Derfler, Jr., via MCI Mail (use Derfler's box named CONNECTIV-ITY CLINIC).

Your Touch Typists.

Without stopping to hunt for function keys WordStar users can:

- lay out pages with up to 8 snaking
- columns create footnotes for each page or
- at the end of the document import Lotus 1-2-3 and dBase files
- without conversion
- ♦ customize mailings
 ♦ view documents as they will print

including exact fonts and sizeseven view multiple pages at once.

Thousands of touch typists know and use WordStar, And thousands are more productive on WordStar than they could ever be on a general purpose function key word processor. The timelessness of the WordStar success story is as simple as that.

If there are touch typists in your department or workgroup turn to The Touch Typist's Word Processor. Turn on the power of WordStar.

For more information about how WordStar can help you get the most out of your workgroup's touch typists see your dealer or call 1-800-227-5609, ext. 615.

WORDSTAR 5



All trademarks acknowledged. © 1989 MicroPro International Corp., 33 San Pablo Avenue, San Rafael, CA 94903, (415) 499-1200.

CIRCLE 480 ON READER SERVICE CARD

We make a super VGA monitor



NEC introduces the best VGA monitor you can buy. MultiSync* 2A.

The first monitor that takes our award-winning multiple frequency technology and cus-

tomizes it to the needs of the VGA user.

MultiSync 2A is both affordable and uncompromised. And completely compatible with all VGA modes. In short, it performs brilliantly. But what's equally important, it allows you to move effortlessly to the next major graphics standard: SuperVGA.

All this in a monitor that gives you a 14" non-glare screen on a tilt-swivel base, for nearly 30% more viewing area than standard 12" screens, and a new cabinet that's not only functional but is designed to look as good from the back as it does from the front.

MultiSync 2A. One super VGA monitor.

that's also a SuperVGA monitor.



But that's only part of the story. NEC also introduces the best SuperVGA monitor you can buy. MultiSync* 2A.

The first monitor that takes our award-win-

ning multiple frequency technology and customizes it to the needs of the SuperVGA user. MultiSync 2A senses the software you're using and makes the switch from a VGA monitor to SuperVGA, the new standard developed by NEC and recognized by VESA, the Video Electronics Standards Association. SuperVGA delivers a maximum resolution of 800 x 600, which is 56% higher than VGA.

And since you're most likely buying a board that goes beyond VGA, your monitor should too. For literature call 1-800-826-2255. For technical details call NEC Home Electronics (USA) Inc. at 1-800-FONE-NEC.

MultiSync 2A. One SuperVGA monitor.



Count on CompuAdd.

CompuAdd Starter Kits provide a great way to get into personal computing immediately. We've bundled computer and keyboard, hard drive, monitor, printer, software and all the accessories and supplies you need to get started, and packaged them in a specially priced kit. And we've created an assortment of Starter Kits to meet the price and performance needs of a variety

Executive Starter Kit Computer:

CompuAdd 386/16

80386-16 processor providing 16MHz, 8MHz, 6MHz, or 4.77MHz software selectable

system speeds 0 wait state (Page-mode)

1MB RAM expandable to 4MB (Option to 10MB RAM)

5.25" 1.2MB floppy drive

Dual floppy/hard drive controlle

Five 16-bit and two 8-bit expansion slots

80287 math coprocessor

Choice of AT-style, 5151, or enhanced 101-key keyboard

Monitor Monochrome monographics video package, or enhance your system with EGA or VGA video.

Hard Drive 40MB fully installed, or upgrade

to a higher capacity drive.

Printer Epson™ LX-800

180cps draft, 30cps near letter

 Multiple type styles Tractor/friction paper feed

Software CompuAdd INTEGRATOR™

Program/file managers, cardfile database, calendar. calculator, text editor, and PC-FullBal

CompuAdd MS-DOS* and GW BASIC*

floppies

Accessories 200 sheets of continuous form

paper
 Printer cable and ten blank

Herri Drives



Professional Starter Kit" Computer:

CompuAdd 286/12

80286 processor providing 12MHz and 6MHz switchable

system speeds 512KB RAM expandable to

5.25" 1.2MB floppy drive

 Dual floppy/hard drive controlle

Eight expansion slots Math coprocessor support

 Choice of AT-style, 5151, or enhanced 101-key keyboard Monitor

Monochrome monographics video package, or enhance your system with EGA or VGA video.

20MB fully installed or upgrade to a higher capacity drive.

Epson LX-800

180cps draft, 30cps near letter quality

 Multiple type styles · Tractor/friction paper feed

CompuAdd INTEGRATOR Program/file managers. cardfile database, calendar, calculator, text editor, and

PC-FullBak CompuAdd MS-DOS and GW BASIC

· 200 sheets of continuous form

paper • Printer cable and ten blank floppies

Harri Drives

Career Starter Kit"

CompuAdd Turbo/10

 8088 processor providing 10MHz and 4.77MHz switchable system speeds

5.25" 360KB floppy drive

 Floppy drive controller Eight expansion slots

 Math coprocessor support Choice of AT-style, 5151, or enhanced 101-key keyboard

Monochrome monographics video package, or enhance your system with EGA or VGA video.

 Hard Drive Optional hard drive.

Star Micronics NX-1000"

120cps draft, 30cps near letter

 Multiple type styles, nine-pin print head

Tractor/friction paper feed

 Professional Zen Software A totally integrated software package: ZenWord™, ZenCalc™ and ZenLink™ PC-FullBak software with optional hard drive

CompuAdd MS-DOS and GW BASIC

· 200 sheets of continuous form

paper Printer cable and ten blank floppies

\$929

		Ψυ		
Hard Drives	MGA	EGA	VGA	
No Hard Drive	\$929	\$1279	\$1479	
OOM ATT	04470	ALESO.	61700	

CompuAdd systems deliver some surprising numbers for remarkably low prices.





CompuAdd designs and manufacturers a full line of affordable, reliable computers employing proven 80286/80386 technology. These systems are earning a reputation for dependability in thousands of demanding business and institutional applications every day.

CompuAdd backs every system with a 30-day money-back guarantee and a full one-year warranty. Expert on-site service is available from Memorex Telex Corporation.

Our experienced technical support personnel answer your installation and operation questions and solve most problems immediately by toll-free telephone. When required, CompuAdd will send you a new exchange part within 48 hours shipped Federal Express. We pay the freight both ways.

CompuAdd 386/16 . 80386-16 processor running at

- 16MHz, 8MHz, 6MHz, or 4.77MHz software-selectable system speeds
- · 0 wait state (page-mode memory)
- . 1MB RAM expandable to 4MB (Option to 10MB RAM)
- CompuAdd INTEGRATOR™
- productivity software package Choice of 5.25" 1.2MB or
- 3.5" 1.44MB floppy drive
- · Dual floppy/hard drive controller · Five 16-bit and two 8-bit expansion slots
- · 80287 math coprocessor support · Choice of enhanced 101-key,
- AT-style, or 5151 keyboard
- . 17.6 on Norton's SI Benchmark 4.0 test

CompuAdd 286/12

- · 80286-12 processor running at 12MHz or 6MHz, switchable system speeds
- · 0 wait state
- . 512KB RAM expandable to 1MB CompuAdd INTEGRATOR
- productivity software package Choice of 5.25" 1.2MB or 3.5"
- 1.44MB floppy drive · Dual floppy/hard drive controller
- . Six 16-bit and two 8-bit expan-
- · 80287 math coprocessor support · Choice of enhanced 101-key, AT-
- style, or 5151 keyboard
- 13.7 on Norton's SI Benchmark

\$995

CompuAdd 286/10 . 80286-10 processor running at

- 10MHz or 6MHz, switchable system speeds
- 512KB RAM expandable to 1MB CompuAdd INTEGRATOR
- productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- · Dual floppy/hard drive controller · Six 16-bit and two 8-bit expan-
- · 80287 math coprocessor support · Choice of enhanced 101-key,
- AT-style, or 5151 keyboard · 9.4 on Norton's SI Benchmark

\$895

CompuAdd Turbo/10

- · 8088 processor running at 10MHz or 4,77 MHz switchable
- 640KB RAM
- . 5.25" 360KB half-height, dualsided floppy drive
- · Dual floppy disk controller board Eight XT-compatible expansion
- slots Math coprocessor support
- · Front panel display with keylock, reset button, turbo button, plus LED indicators
- · Choice of enhanced 101-key, AT-style, or 5151 keyboard

\$2,799

800-666-1872

Customer Service: 800-999-9901 Telex: 763543 COMPUADD AUS

Fax: 512-250-5760

USA: 512-258-5575



Count on CompuAdd.



AT' Hard Drives

Al Halu Dilves
Drives include cables, mounting hard- ware, manual and FREE PC-FullBak™ disk backup sofware.
43MB MiniScribe® (25ms) \$459 71MB MiniScribe (28ms) (Reg. \$649)
80MB Seagate® (28ms) \$669 117MB Seagate (28ms) \$869
VT* Hard Drives

X I Hard Drives Drives include cables, mounting hardware, controller card, and FREE PC-FullBak disk backup sofware. 30MB Seagate (65ms) \$279 40MB MiniScribe (61ms) ... \$379 20MB MiniScribe (65ms) for Compaq Portable

Tandy*-Compatible Hard Drives

20MB MiniScribe (65ms)	
For 1000/A	\$319
For SX/TX	\$319
For 3000HL	\$375
40MB MiniScribe (61ms)	
For 1000/A	
For SX/TX	\$395
43MB MiniScribe (25ms)	
For 3000HL	\$749

FlachCarde

FlashCard-20™
MiniScribe (65ms) \$299
For Tandy-compatibles \$359
FlashCard-30™
MiniScribe (65ms) \$339
For Tandy-compatibles \$379
FlashCard-49™
Seagate (40ms)

I/O Cards

AT I/O serial port and parallel port (Reg. \$59) . . . \$49 XT I/O serial port, parallel port, clock/calendar, and game port\$65

Diskette Drives

Distrette Diffees
360KB half-height 5.25" floppy
drive for the XT (black) \$99
360KB half-height 5.25" floppy
drive for the AT (gray) \$109
720KB half-height 3.5" floppy
720KB half-height 3.5" floppy drive for the XT (black) \$109
720KB half-height 3.5" floppy
720KB half-height 3.5" floppy drive for the AT (gray) \$115
1.2MB 5.25" floppy drive
for the AT (gray) \$109
1.44MB half-height 3.5" floppy drive (gray) (Reg. \$135) \$89
drive (gray) (Reg. \$135) \$89
Personal System/2™
compatible external drive
installs as drive B and permits
transfer from 360KB to
720KB format \$199

Monitors

MGA	
12" flat screen monitor with	
tilt/swivel	\$95
Amdek® 210A monitor	
12" nonglare screen \$	109
Amdek 432W monitor with	
flat screen and tilt/swivel \$	220

IBM -compatible color monitor 13" diagonal screen \$239

EGA					
IBM-com					
monitor	 	 	 		\$34

VGA

Color VGA 13" analog	051
monitor Zenith 14" Color VGA	
640×480	.\$75

video Cards	
Monographics card up to 720×348 resolution	\$49
Hercules Monochrome	
Graphics Card Plus up to	
720×348 resolution	. \$179
Hercules [™] Color Graphics	
card for AT on a half-size	
card. CompuAdd EGA-480 IBM/	\$149
CompuAdd EGA-480 IBM/	
EGA-compatible card with	
256KB display memory	\$179
CompuAdd VGA card	
800×600 resolution, 16/256K	
colors, supports IBM VGA,	
CGA, and Hercules	
Monochrome graphics	\$220
Video-7" Vega VGA card	
640×480 and 800×600	
resolutions with 16/64 color	
capability	\$279
Monitor/Card Com	bos
Monographics 12" flat	
screen with tilt/swivel,	
monographics card	\$139
monograpinos card	4.00

VGA graphics card \$695

Multifunction Boards

AT Multifunction board with OKB, up to 1.5MB RAM expansion, serial, parallel and game ports, for ATs and .\$85.99 compatibles (Reg. \$99) XT Multifunction board with 384KB RAM, parallel port, serial port, clock/calendar, and game port for PCs or \$199

Memory Carde

MEM-576 with 0KB \$35
EMS XT with 0KB \$99
EMS AT with 0KB \$119
Intel Above™ Board Plus
with 512KB

Modems

1200 baud CompuAdd	
(internal)	. \$69
1200 baud CompuAdd	
(external)	. \$89
Everex Evercom™	
1200 baud (internal)	. \$89
Haves Smartmodem™ 1200E	3
1200 baud (internal)	\$299
Hayes Smartmodem 1200B	
1200 baud (external)	\$319
2400 baud CompuAdd	
(internal)	\$139
2400 baud CompuAdd	
(external)	\$159
Everex Evercom	
2400 baud (internal)	\$149
Hayes Smartmodem 2400B	

Hayes Smartmodem 2400B 2400 baud (external) \$469 Pointing Devices

2400 baud (internal) .

Logitech® HiREZ Mouse with 320 dots per inch resolution capabilities. ...\$109 Bus interface. CompuAdd Serial Mouse features Dr. HALO III™, pad. and pocket . Genius Digitizer Tablet provides resolutions up to 1000 lines per inch on a 12" x 12" work area. Includes Dr. HALO \$309 CompuAdd Joystick \$19.95

ORPORATION

12303 Technology Blvd.

Austin, Texas 78727

Order Toll Free:

Mach III Joystick \$35 800-666-1872

Customer Service: 800-999-9901

Fax: 512-250-5760

Telex: 763543 COMPUADD AUS

USA: 512-258-5575

CompuAdd offers everything for personal computing. Phone now. We'll pay for the call.

Printers
Okidata 321 132 columns,
250cps draft, 63cps NLQ \$529
Epson® LX-800 80 columns.
180cps draft, 30cps NLQ \$209
Epson FX-1050 132 columns.
264cps draft, 54cps NLQ \$479
Epson EX-800 80 columns,
300cps draft, 60cps NLQ \$395
Epson LQ-500 80 columns,
180cps draft, 60cps NLQ \$305
Epson LQ-1050 132 columns
264cps draft, 88cps LQ \$799
Panasonic® 1091i 80 columns,
192cps draft, 38cps NLQ \$219
Panasonic 1595 132 columns,
240cps draft, 51cps NLQ \$479

192cps draft, 63cps LQ \$389 Switch Boxes

Panasonic 1124 80 columns.

25-pir X (2/2)				ï			٠.	Ī		ı		Ţ	1	ı		J		\$35
AB (2/	1) .		ì	ì	ì	i	ì	ì	ì	ì	ì	ì	ì	ì	ì	ì	Ċ	\$13
ABC (3/1)		i	i	į	ĺ.	i	i	ĺ	ĺ	i	i	i	ĺ	ĺ.	ĺ.	i	\$29
ABCD	(4)	1)								Ĺ								\$33



36-pin Centronics
X (2/2)
AB (2/1) \$29
ABC (3/1)\$29
ABCD (4/1) \$33
Automatic
Serial (4/1)
Serial (8/1)
Parallel (4/1) (Reg. \$79) \$55.99
Parallel (8/1) \$99
Tape Backups

40MB Internal (AT)					
40MB Internal (XT)	١,				
60MB Internal		 	 		
60MR External					

Math Coprocessors

							•												ī	
8087-3	١.,																ď	\$	1	ķ
8087-2	١																1	\$	l	ī
80287	6.																4	\$	17	Ĺ
80287	8.																Ş	Z	Ľ	ì
80287	-10																Ş	Y	Ş)
80387	16																9	14	Į)
80387	-20	١.															Ş	ı	iε	1
80387	25							ì				ì					\$	6	35)
		1	K	E	9	y	t)(0	ê	3	n	d	5	3					

AT-Style 5060 keyboard

has 84 keys and enlarged	
ENTER and SHIFT keys for	
easy operation	\$69
Enhanced 101-key	
keyboard for AT or XT	
compatibles with 101 keys	
Including 12 function keys	\$69
5151 keyboard for the IBM	
AT, XT, and compatibles.	
Includes separate numeric	
and cursor key pads	\$69

Software

For IBM® -compatibles unications

Communications	
Carbon Copy Plus™	\$113
Carbon Copy Plus (3.5")	\$113
CompuServe®	
Subscription Kit	\$21
Crosstalk XVI®	\$103
Smartcom II®	\$87
Compilers and Langu	ages
Microsoft® C Compiler	\$312
Microsoft FORTRAN	
Optimizing Compiler	\$312
Microsoft Macro Assembler	\$102
Microsoft QuickC™	
Compiler	\$67
Microsoft QuickBASIC™	\$69
Turbo C®	S108
Turbo Pascat®	. \$108
Desktop Publishing	
Aldus PageMaker®	\$577
FONTASY®	\$36
PFS: First Publisher	\$76
PFS: First Publisher	
Art Gallery	\$75
Deleterates Discallé	622

FONTASY®								\$3	
PFS: First Publisher	ı,							\$7	•
PFS: First Publisher	r								
Art Gallery								\$7	
Printmaster Plus	٠	٠	٠	٠	٠	٠		23	
NewsMaster II™								\$4	
Databases									

Printmaster Plus™	i			i		i	i	i		\$	4
NewsMaster II™						i				\$	d
Databases											
dBASE IV™									\$	4	į
PFS: Professional	F	ik	A		ı				5	1	i

dBASE IV™
PFS: Profession:
F 1 3. F 1010331011

Т	Q&A™	 91	a	3	31	U	111	a	,	г
1	Q&A™	٠			٠			•		٠

Order Toll Free: 800-666-1872 Customer Service: 800-999-9901

Telex: 763543 COMPUADD AUS

Fax: 512-250-5760 USA: 512-258-5575

CIRCLE 294 ON READER SERVICE CARD



Utilities

Copy II® PC



Reg. \$74.95 Only \$29.95	Disk Optimizer™
Financial	FASTBACK Plus (3.5") Norton Commander
DAC-Easy™ Accounting \$59	Norton Utilities™ Advanced
DAC-Easy Light™\$42	PC-FullBak™
DAC-Easy Payroll™	PC Tools® Deluxe
Managing Your Money* \$129	Word Processors
Quicken®\$30	
Svlvia Porter's	Gram-mat-ik III™
nvestment Manager™ \$89	Microsoft Word
Fimeslips® III \$117	MultiMate Advantage II™.
initosips in	PFS: Professional Write
Games	Q&A Write™
Flight Simulator	WordPerfect® (Version 5.0)
Flight Simulator (3.5") \$35	WordPerfect (3.5")
King's Quest™IV \$29	WordStar® Professional .
ring s Quest V	0
Gunship™ \$30	Compu Add We offer the best service and support a
eisure Suit Larry Goes	mail order industry, so you can p
Looking for Love™ \$29	confidence:
Manhunter	FREE one-year limited warranty FREE 30-day, money-back guarantee
Mean 18 Golf \$24	FREE one year of technical phone su
Police Quest II™\$29	FREE credit card ordering — no sure
Scrabble	Please add 2% to all purchases to handling (minimum \$3, shipping outside
Test Drive \$26	U.S. will increase cost). Add 5% for ship

Integrated Pa	ı	:	k	a	q	E	1	S		
Framework II™ .					Ī					\$
Microsoft Works.										
PFS: First Choice										
Symphony®										Ş
Symphony (3.5")										Ş.

Organizational	
Harvard™ Total Proje	c
Manager II	
Microsoft Project	

Time Line"

IIIIe FIIIe (00	,		•	٠	٠	
preadshe	e	ts				
dicrosoft Exce	ı .					

spread	8	ш	ĸ	3	c	U	8							
Aicrosoft	E	X	c	е	ı									
Quattro™														
P-Plann	e	۴	•											
office 1.2	.3	3	1	A	'n	k	ı.	5	k	ř	29	2)		

\$24 \$29 \$26 \$26	• FRE • FRE • FRE Ple handi U.S. w
ages \$450 \$99 \$95 \$449	must Author custor chang Georg add ag guara and hi We
s468	checking), Cor tonal Cor We you re accep appro

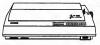
t	We accept MasterCard, VIS
1	checks, personal checks (pleas
	ing), CO.D.s (\$50 minimum or tional purchase orders, and w
.	Corporate and Instit

Fax: 512-250-5760 Telex: 763543 COMPUADD AUS

12303 Technology Blvd.

Austin, Texas 78727

Your BEST Source for Laptops



TOSHIBA

321SL Narrow 419

TOCHIRA

IOUIIIDA
T1000 729
768K CARD 249
T1200HB 2299
T3100E 2599
DICONIX 150 Parallel 299
With Purchase of Any Laptop 269



MITSUBISHI 286L-20 MB	T5100 4399 T5200-40MB 5999	Designer Carry Case w/pockets for SW, manuals, portable printer etc.
NEC	T5200-100MB 6999	Specify model
MultiSpeed EL II		Expansion Chasis 869
Battary Pack-Specify EL or HD 99	ACCESSORIES for Toshiba Laptops	WonUnder: Single expansion slot 269
Floppy 5.25* Ext 360K for HD	AC Adapter: T1000/1100+ 69 AC Adapter: 110/220 volts for	Floppy 5.25° Ext 360k
TOSHIBA LAPTOPS	T1200/T1600 99	MEMORY EXPANSION
T1000 729	Auto Adapter: T1000/1100 + 59	T1000: 768K Card 249
T1200F 1299	Battery Charger: T1200/T1600 239	T1200: 1MB 649
T1200FR 1499	Battery Pack: T1200/T1600 79	T1600: 2MB
T1200HB 2299	Carry Case by Toshiba	T3120: 1MB 649
T1600 3099	Fabric: T1000/1100/1200 59	T3100E: 2MB
T3100E 2599	Fabric: Other Models	T3200: 3MB 1299
T3200 3399	Leather: T3100/3200/5100/5200 249	T5100: 2MB

MODEMS		
T1000		CALI
FOR T1200/1600/3	00/5100/	5200
Toshiba 1200 Int		24
Toshiba 2400 Int		299
Megahertz 1200 Ini .		149
Megahertz 2400 Int		
Prometheus 1200 Int		125
Prometheus 2400 Int		221
Adaptamodem 2400	Int	221
World Port 1200 Ext		151
World Port 2400 Ext		
Toshiba cable for Ext	Moderns .	21
Numeric Keypad: Spe	tabana sita	

	RIN					
ALPS Allegro						351
ALQ 324E						699
* DICONIX I	skJet	150	0 08	ratio	el .	
with 3' or 6'	cable					291
with any Lag	too					269
NEC P2200 P	arallel					32
5200/5300					499	185
Color Kit 520						
PANASONIC						
1595						
TOSHIBA 311						
321 SL						
341 SL						
KENSINGTON						

DRIVES & BACKUP

40 MB
TOSHIBA 3.5° Internal with
Universal mounting kit
720K/1.44 MB
SEAGATE: For PC/XT HALF HT
PRO PACK 20 MB (ST 225) 259
PRO PACK 30 MB (ST 238) 279
Fully Pretested, PRO PACK includes
controller, cables, detailed & illustrated
manual. Six months warranty.
PC/XT Mtng Kit & Filler Plate 10
MOUNTAIN: Uses Floppy Controller
40 MB Back-up: Internal for AT 379
DC 2000 Single / Box of 5 25 / 120

KEYBOARD/MOUS	
for PC/XT/AT	109
OEM Varsion: Identical to 101 with	
90 day warranty from us	. 69
Keytronic Mouse	
Bus or Serial	. 99
LOGITECH PS/2 Mouse	. 75
C-7 Serial or Bus	
HiRez Bus	89
Serial w/ Clear Case	. 99
Logitech Publisher	. 49
LogiPaint/LogiCadd 2	9/49
MICROSOFT Mouse: Bus or Ser	109
With Windows	149
MOUSE SYSTEMS W/PC Paint Pix	ıs
Serial or Bus	. 99
QUADRAM Optical Mouse	70

SOFTWARE BONANZA
All software is lactory sealed & comes
complete with menuals. BATTERY WATCH Var 1.0 - 3.5" 39
BITCOMM 3 Ver 3.5 - 5.25"
BORLAND Sprint Ver 1.0 - 3.5" 89

BORLAND Sidekick: Spcty 5.25 or 3.529
BORLAND Sprint Ver 1.0 - 3.5" 89
CARBON COPY Plus Ver 1.5 - 3.5" 49
GEM GRAPH 5.25" 49
LAPLINK PLUS
LOG! Paint/LOGI Cadd 29/49
LOGITECH Publisher 49
LOTUS Metro 3.5* Var 1.0 29
MICROSOFT Windows 366 Ver 2.03 - 3.5" 99
PC KWIK Power Pak Ver 1.1 - 3.5". 49
PC PAINT Plus - 5.25"
WORDSTAR EASY Ver 1.5 - 3.5" 49

FAX MACHINES	BOARDS
PANAFAX UF-155	999
SHARP FO-220	889
SHARP UX-180	869
SHARP FO-420	1199
SHARP UX-350	
MURATA M1200/M1600	649/749
QUADRAM JT Fax Board	
JT Fax Board 9600	549
JT Fax Portable 4800	349
THE COMPLETE PC	
Fax Board 4800	249
Fax Board 9600	469

MONITORS OPEN A MANUS PAR BEA CARE Logishouse & Paris Stow 1988 1989 1999	KEYBOARD / MOUSI KEYBOARD / Paus Professional KEYTONICS (1) Paus Professional KEYBOARD / Paus Professional KEYBOARD / Paus Professional SO day warranty from us Keytonic Mouse Bus or Serial LOGITECH P5/2 Mouse C.7 Serial or Bus Hifler Bus Hifler Bus Serial or Bus LOGITECH P5/2 Mouse C.7 Serial or Bus Hifler Bus LOGITECH P5/2 Mouse C.7 Serial or Bus Hifler Bus William Code MICROGOFT Mouse Bus or Ser 1 MOUSE SYSTEMS v/C Pairy Pius Serial or Bus MICROGOFT Mouse Bus or Ser 1 MOUSE SYSTEMS v/C Pairy Pius Serial or Bus
enith Tilt & Swivel	Serial or Bus

MATH/RAM CHIPS	
4K RAM 120 ns Set of 9	30
56K RAM	
087-2 PC/XT 8 Mhz	139
0287-8 AT 8 Mhz	215
0287-10 AT 10 Mhz	239
0387-16 for 386 machines	379
0387-20 for 386 machines	469
0387-25 for 386 machines	599

MODEMS Also See Under Lap Tops

	ATI VGA Wonder (2
IATH/RAM CHIPS	GENOA SuperEGA SuperVGA HiRes
RAM 120 ns Set of 9 30	ORCHID Pro Design
C RAM CALL	Pro Designer VGA
7-2 PC/XT 8 Mhz 139	PARADISE VGA PIL
97-8 AT 8 Mhz	Paradise VGA Plus
87-10 AT 10 Mhz 239	Paradise VGA Profe
37-16 for 386 machines 379	VIDEO-7 Vega VGA
87-20 for 386 machines 469	FastWrite VGA
37-25 for 386 machines 599	Vega V-RAM VGA (
	ZENITH Z-449
	9 to 15 Pin Connect

DISPLAY CARDS	
ATI VGA Wonder (256k)	319
GENOA SuperEGA HiRes +	
SuperVGA HiRes 5200-10	379
ORCHID Pro Designer VGA	329
Pro Designer VGA Plus	429
PARADISE VGA Plus	269
Paradise VGA Plus 16	299
Paradise VGA Professional	499
VIDEO-7 Vega VGA	269
FastWrite VGA	339
Vega V-RAM VGA (256k)	499
ZENITH Z-449	
9 to 15 Pin Connector-Required for	
some Monitor/Card combinations .	. 20

POWER

SUPE	R SPE	CIALS	
SENOA Super EGA Hi Res+	159	TOSHIBA 321SL/341SL	

79	2400 External w/sw 1-
	PAID BY CHECK ONLY * ARKED BY APRIL 10, 1989 *
	TOSHIBA 1200HB/3100E 2259/25

Pocket 1200 Ext 2400 Ext w/AC Adapter

ZOOM 2400 Internal w/sw .

For PC XT 150 Watts
DATASHIELD
300 Watts Turbo Backup 399
450/625 Watts Turbo Backup 469/569
800/1200 Backup 799/1199
SOLID STATE + U P S + 3" High
SS 400 / 700 Watts UPS 729 / 899
KENSINGTON Masterpiece 109
Masterpiece Plus

POLICY: Min order \$100 for COO! Credit Cards. Prepaid orders Min. \$50 Proce & availability subject to change, Shopping changes very (Min. \$10), Prices reflect discount for advance payment. Add 2nd (Min. \$5) for COO! 3 Discount, 9nd for MCI/CV and only 9nd for Mark 20 Grant COO! requires calculor or cardier clerks. No otherwise makes All states first. Released disprants adulged to a 20th ortape (Min. \$50), Not responsible for completable), excluder MCI/CV and COVID-CV and COVID-CV and COVID-CV and CV an

FOREIGN ORDERS: For foreign orders add special handling charge of \$30 per order. Air shipments add 10% (Min. \$50), For Pinniers & Monitors 30% (Min. \$150), Some items may be more. Credit card orders, add 5% to amount owed.

12605 HOOVER STREET, GARDEN GROVE, CA 92641

* FREE DELIVERY *

* PREPAID ORDERS IN CONTINENTAL USA ONLY *

* PREPAID OF DETAIL ON OUT.

Simply mail the check for the exact amount (CA add 6%) as shown here with your order. We will ship your order UPS Ground, FREE of any other charges, it is that simple. Money order/Bank check orders shipped immediately.

Personal/Co, checks delay shipment 2/3 weeks. (Credit Card orders are not

PLEASE REFER TO AD # PC 910

HEADSTART III. SAVE \$500

HeadStart III™ delivers speed, power and performance. PC Network delivers the savings.

HeadStart III is the first advanced system to come complete with all the features advanced.users need and expect all in one ready to run package! Nothing extra to buy - and no hassles putting it together!

HeadStart III comes complete with all these powerful, advanced features.

- Multi-tasking capability
- OS/2 raedy Duel formet - runs 5.25" end 3.5"
- diskettes
- 6-in-1 VGA graphics
- 1MB of RAM expendeble to 3MB Complete library of business and
- rofessionel softwara Easy to use HeedStart Advanced
- Operating Environment 3-button Mouse

UNIQUE **DUAL FORMAT**

With HeadStart III, you don't have to worry about whether you've made the right choice of operating systems. A 1.44MB 3.5" and a 1.2MB 5.25" floopy drive are both built in. Create new files using high capacity 3.5-Inch OS/2 diskettes and still run all your current files stored on 5.25-inch DOS diskettes.



On top of all this, HeadStart III is OS/2 ready. It runs the kinds of powerful applications businesses today can't do without.

MULTI-TASKING SPEED AND POWER

Enter data, print out, perform analyses...HeadStart III easily does several things at once. With HeadStart III attached to the host or acting as a file server, your people can each do their job without Interrupting yours.

HeadStart III's 80286 CPU and 1MB installed RAM, in tandem with 32MB hard disk drive with an astonishing 1 to 1 interleave, store all your information...and then get it to you the instant you need it.



PC NETWORK EXCLUSIVE... **ORDER NOW AND SAVE \$500!**

HEADSTART III

Buy the complete HeadStart III System with VGA Color Monitor and save \$500. Or, lease it for as low as \$99 a month..

HEADSTART III SPECIFICATIONS

MICROPROCESSOR:	Intel 80286-1	HARD DRIVE:	32MB, 28 milliseconds, 1:1
SPEED:	12MHz/4.77 Switchable		Interleave
BIOS:	Award	BUILT-IN	
BUILT IN RAM:	1MB	INTERFACES:	Parallel. 2-RS232 serial,
ROM:	32K		mouse, lovstick
EXPANDABLE TO:	3MB	EXPANSION SLOTS:	Six 8/15 bit (3 available to use
KEYBOARD:	101 key "PS/2" compatible	MOUSE:	Standard Opto-mechanical
BRAPHICS:	VGA Autosync	POWER SUPPLY:	145 watts 110/220 switchable
FLOPPY DRIVES:	One 1,2MB 5,25*		
	One 1.44MB 3.5"		

A GRAPHIC IMPROVEMENT

Whether you're an expert in desktop publishing or accounting, HeadStart III's true 16-bit built in VGA graphics will bring out the artist in you. Create your own visuals or display color photos every bit as sharp and brilliant as the original, in up to 256 colors at once from a palette of 256,0001

Bulld up HeadStart III as you build up your business. Attach modem, printers and other peripherals without ever opening the back. And use the 3 full size "AT" compatible expansion slots for networking, adding a fax card or installing an internal modern.

BRAND NAME PROGRAMS...FREE!

On top of the unique HeadStart Advanced Operating Environment that makes it so easy to master, HeadStart III includes thousands of dollars worth of top-selling applications software FREE.

- Floppy Driver™
- Bookmark Plus™
- Framework IITM by Ashton-Tete
- Perspective Thrae-D Graphics™
- Twist & Shout™
- Publish-It*** ■ Splashi™
- M XTrae™
- Computer-Eese™
 ATI™ Skill Builder
- Chessmester™ 2000

SUPPORT YOU CAN COUNT ON

1-800-PC-COACH

When you need assistance or have technical questions about your hardware or software, simply call 1-800-PC-COACH - The nationwide hot-line available only to registered HeadStart III owners.

ON-SITE SERVICE

HeadStart III is backed by a full 18-month Limited Warranty on parts and labor. Should service be required, a trained technician from the nationwide Harris consumer network will be sent to your location at no charge during the warranty period.

LEASE AS LOW AS \$99/MONTH

PC Network can custom design a leasing program to fit your business needs. It gives you 100% financing to free your working capital or credit lines, and lets you enjoy substantial tax advantages.

PC NETWORK IS A MEMBER OF THE



MAJOR CREDIT CARDS ACCEPTED HRS: MON - FRL: 8:30 AM - 6:00 PM SAT.: 10:00 AM - 4:00 PM

PM0489



PC NETWORK. SERVICE

























\$679

. Intel 8088-1Switchable from 4,77 to 10MHZ = 512K RAM Expandable to 640K · 360K Floppy Drive · Dual Floppy Controller = 150 Watt Power Supply - Mono/ Color Video Graphics Board • 12" Monochrome Monitor • 1 Serial/1Parallel/1 Game Ports & Clock • 101 "AT" Style Key Keyboard - FREE 1 Year Warranty.

Complete Systems With Color Monitors

CGA Color System	\$86
EGA Color System	\$107
CGA w/20MB	\$114
EGA w/20MB	\$136

THE™ COMPLETE 40MB 286/12 PROFESSIONAL SYSTEM

 12MHz Switchable Speed • 512K RAM Expandable to 1024K - 1.2MB Mitsubishi Disk Drive • FDC/HDC Dual Controller • 40MB Seagate 28MS (ST251-1) Hard Drive • 1 Serial/1 Parallel/ & Game Port • Color/ Mono Graphics Card - 101 "AT" Key Keyboard • 200 Watt Power Supply • 12* Monochrome Monitor • FREE 1 Year Warranty

40MB Systems With Color Monitore

\$1779 \$2099 \$2199	



9 Pln Dot Matrix \$199.

1524 240/80 cps

1592 220/38cps

1595 290/51cps .

KXP 4450 Laser w/Toner

PANASONIC 1180i 192\30 \$199. 1124 192/63 cps 339

. 575.

.. 415.

449

EPSON	
LX 800 180/32cps	199.
EX 800 300/60cps	439.
FX 850 264/54cps	359.
FX 1050 200/54cps	467.
LQ 500 180/60cps	328
LQ 850 264/88cps C.	ALL.
LQ 1050 264/88cps C.	ALL.
LQ 2550 400/133cps	949.
DFX 5000 533/80cps C.	ALL.
NEC	
P2200 170/55cps\$	369.
P5200 265/90 cps	530.
P5300 265/70 Wide	719.
P9XL 400/330 cps1	
LC890 Laser3	
OKIDATA	
ML 182P 180/30\$	239.
ML 320 300/83	345

04	CIDATA
	\$239.
	345.
	479.
	479.
	655.
	1005.
ML 393 COLOR.	1079.

	HE	WLETT	PAC	KARD	
Desk	et				. 8
aser	Jet II				. 1
		DIC	ONIX		

150n 150/50 300 WP 310/73

MONITORS

MAGNAVOX 14" Analog VGA Monitor \$379

VGA Plu

Amber T

14" VGA

14" RGB

\$579.
\$75.
149.
249.
349.
419.
\$249.

4" VGA (800x600)	
MITSUBISHI	
409 13" CGA (640x200)	\$249.
410 13" EGA (640x350)	361.
Diamond Scan (800x800)	490.

SONY
Hieran /103

1303	13" Multiscan (800x600) 522	
	ZENITH	
1390	13" RGB (640x480) \$439	١.
1490	14" FTM Monitor 648	ı,
	NEC	
Multis	sync II 13" (800x600) \$599	u
Multis	ync XL 19" (1024x768) 2249	Ĺ

ATI EGA Wonder 800

VIDEO BOARDS	
THE™ Mono/Color	\$59.
THE™EGA /480	
THE**VGA/256	
PARADISE Autoswitch 480	
PARADISE VGA+	
VIDEO 7 VEGA VGA	
VIDEO 7 VEGA DELUXE	
ORCHID Pro Designer VGA	
ORCHID Decision VGA 900	225

COMPUTER SYSTEMS

AST Premium 386 MDL. 300 \$2770. AST Premium 286 MDL, 140. COMPAQ Deskpro 286-/40MB .. CALL. COMPAQ Deskpro386-25/110 .. CALL. COMPAQ Deskpro 386-20/60MB CALL IBM MDL. 30-21, 20MB CALL. IBM MDL. 30-286, 30MB .. CALL IBM MDL. 50Z,30/MB CALL VENDEX Headstart II/III .. CALL

NEW! TOSHIBA T-3100E \$2799.



T-1000	\$779
T-1200H/HB 221-	4/2399
T-1800 NEWI	CALL
T-3100E NEWI	2799
T-3200	3599
T-5100	4749
T-5200 NEWI	CALL



Supersport MDL, 2.

Supersport MDL, 20

ZENITH Supersport 286 with 20MB

\$3199.

CALL

ZENITH









SELECTION PRICE









5.0



SOFTWARE





CO-PROC	ESSORS/C
INTEL 8087-1 .	
INTEL 8087-3 .	
INTEL 80287-8	
INTEL 80287-10	
INTEL 80387-10	3

CO-PHOCESSONS/CHIP	
TEL 8087-1 \$	
TEL 8087-3	109.
ITEL 80287-8	
TEL 80287-10	279.
ITEL 80387-16	442.
ITEL 80387-20	
TEL 80387-25	650.
HE™ 640K Upgrade Kit Ci	ALL.
HE™ Memory Upgrades C.	ALL.

Wordl briegt SPECIAL WordPerfect \$225

PLOTTERS/DIGITIZERS

HOUSTON DMP 41, 42, 52, 61	CALI
HOUSTON DMP 52MP, 62MP	CAL
ROLAND DXY 885 DXY980	CAL
CALCOMP 1023	CALI
SUMMASKETCH 12X12	379
SUMMASKETCH 12X16	645
SCANNERS	

DISK DRIVES

EAGATE ST-251 40MB/Kit	469
EAGATE ST-251-1 40MB/28MS	435.
EAGATE ST-4096 80MB/28MS	625
IINISCRIBE 3650 40MB/ Kit	377
IINISCRIBE 3675 60MB HD/ Kit	430
IINISCRIBE 6085 71MB/22MS	642
RIAM ID230 230MB/RLL/12MS 1	
ITSUBISHI 360K 5.25"HH	
ITSUBISHI 720K 3.5" HH	
ITSUBISHI 1.2MB 5.25"HH	
ITSUBISHI 1.44MB 3.5"HH	
YSGEN Bridge File 3.5" Ext. Drive	
TOTAL DINGE IN 3.5 EXC. DIVE	

BALL THE	JNCTION	CARRO

AST 6Pack w/384K	\$269
AST Rampage AT w/512K	399
AST Advantage Premium w/5	12K 42
INTEL Above Board + 286 w/	512K 410
INTEL InBoard 386 PC w/1M	B 799
ORCHID Tiny Turbo	260
ORCHID Twin Turbo	371
THE™ Multi I/O XT or AT	64
ACCESSORIE	S
THE™ 3.5°DS/DD Bulk 25	\$3
THE™ 5.25° DS/DD 50 Pack	
THE 5.25° DS/HD Bulk 25	

FUJI 3.5" DS/HD 10 Pack ... FILLI 5.25° DS/HD 10 Pack ... CH PRODUCTS Mach III Joystick

PTI Datashield S100 **CURTIS** Ruby Filter 6 Outlet .

CH PRODUCTS Game Card III

ADOBE Illustrator Windows \$364.
ALDUS Pagemaker 3.0 499.
ASHTON TATE DBase IV 453.
ASHTON TATE Multimate Adv. II 289.
BORLAND Turbo C w/Debugger 92.
BORLAND Turbo Pascal 99.
BORLAND Quattro 159.
BRODERBUND Where USA 26.
BRODERBUND Where World 25.
BRODERBUND Printshop 37.
BRODERBUND Bank St. Writer+ 47.
CENTRAL POINT PC Tools Delx. 42.
CHIPSOFT Pro 1040 228.
CHIPSOFT Personal 1040 46.
DAC Easy Accounting 3.0 59.
FIFTH GENERATION Fastback + 99.
FUNK SOFTWARE Always 85.
FUNK SOFTWARE Sideways 42.
INTUIT Quicken 30.
LOTUS Lotus 1-2-3 299.
LOTUS Symphony 445.
MECA Managing Your Money 117.
MERIDIAN Carbon Copy Plus 114.
MICROSOFT Flight Simulator 35.
MIICROSOFT Word 5.0 CALL
MICROSOFT Excel 2.0 315.
MICROSOFT Works 99.
MICROSOFT Windows 68,/130.
PEACHTREE Business Acct. II 162.
PETER NORTON Utilities Adv 77.
PFS First Choice 95.
PFS Professional Write 115.
PPR Harvard Graphics 285

WORDPERFECT Wordperft.5.0 225.

XEROX Ventura Publisher ...

PANASONIC RS 505 Flatbed	
PANASONIC RS 506 Flatbed 1	25
MICROTEK MSF 300G 2	65
MICROTEK MSF 300CFlatbed 1	
PRINCETON LS 300 w/Adaptor	75
COMPLETE PC Handscanner	17
LOGITECH Scanman CA	Ł

HADD CARDS

3	DEV	ELOP.	Hard (Card 2	20	\$54
3	DEV	ELOP.	Hard C	Card 4	0	69
1	ERN	DIGITA	AL File	Card	(30)	41

ND CANDO	
OP. Hard Card 20	\$54
OP. Hard Card 40	694
SITAL File Card (30	411

FAX
CANON Faxphone 8
CANON Faxphone 20
CANON Faxphone 25
SHARP FO220
SHARP F0300
SHARP FO420

MICE

H Res (Bus)\$95.
Clear Mouse (Serial)95.
2-7 (Serial or Bus)
Mouse w/Paint (Bus or Serial) 88.
MICROSOFT

TAPE BACKUP

MOUNT AIR TOMB EXCITORE AT	
MOUNTAIN 40MB Ext/PS/2 Mdl30	5
MOUNTAIN 150MB Ext. /PS/2	15
IRWIN 145C 40MB INT-/AT	4
IRWIN 120D 20MB/XT	2
PLUS DEVELOP. Pass Port 40	6

CANON Faxphone 25	1945.
SHARP FO220	. 995.
SHARP F0300	1199.
SHARP FO420	1299.
MURATA M1200	. 775.
	_

MOUSEw/Paint & Menus 107. MODEMS

MOUSE w/Windows &Paint .

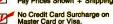
MOUSE w/Easycad

MODEMO	
THE™ 2400 Internal	\$99
THE™ 2400 External	128
THE™ 9600 Internal	379
THE™ 9600 External	399
HAYES Smartmodem 1200	295
HAYES Smartmodern 1200B	295
HAYES Smartmodem 2400	433
HAYES Smartmodem 2400B	433
US ROBOTICS HST 9600	625

PMO489

JOIN PC NETWORK FOR SERVICE, SELECTION & PRICE.

New "Net" Pricing . . . All Members Pay Prices Shown + Shipping.



Fast 24-Hour Shipping on all In-Stock Items.



42

Free Technical Support Before and After the Sale.

Qualified Sales Representatives Standing by to Serve You.



- TECH SUPPORT 1-312-205-1410 CUSTOMER SERVICE 1-312-205-1510
- FACSIMILE 1-312-205-1525

Prington Computer Products gives you the best prices on IBM PCs...and Compaq too!

IBM PERSONAL SYSTEM II Model 30, 286, 20 MB, w/Monitor\$2099 Model 50Z. 30 MB. w/Monitor \$2949

Mode	1 60,	w/44	MB.	and	Monitor		.\$3495
Mode	160,	w/70	мв	and	Monitor		.\$3895
Mode	170,	w/60	MB	and	Monitor		\$4395
Mode	170.	w/121	ME	and	Monito	r	.\$5749
Mode	180,	w/44	МВ	and	Monitor		.\$4595
Mode	1 80.	w/70	мв	and	Monitor		.\$5195

w/Color Monitor add \$250 IBM XT & AT Call for Custom Configurations

COMPAQ 286 DESKTOP - (12 MHZ)

1 Drive 640K, 40 MB, COMPAG PORTABLES

386 Model 40\$5649
386 Model 100\$6995
SLT 20\$3949
SLT 40\$4449
Portable III 20 MB \$3599

w/40 MB\$4175

COMPAQ 386

Model 386S w/40 MB (16 MHZ) \$3695 Model 386E MB (20 MHZ)\$3749 Model 386E w/40 MB (20 MHZ) \$4695 Model 386E w/110 MB (20 MHZ)\$5695 Model w/110 MB-25 MHZ \$7199

Model w/300 MB-25 MHZ \$9099 COMPAQ DESK PRO

1 Drive, 640K, 20 MB Green or Amber Monitor\$1695

\$275

AST PREMIUM

286

10 MHZ, 512K, 1 floppy, 40 MB, serial and parallel ports, mono monitor. \$1949 MULTIFUNCTION

BOARDS

DFI w/384K \$189

AST 6 Pack w/384K \$219 AST Rampage AT w/512K \$389

AST Hot Shot \$355 Everex PSII w/2 MG \$795

Orchid Tiny Turbo \$269 Intel Above Board 286+ \$399 Irma Board \$695 AST 5251-11 \$529 AST 5251-11 Plus Enhanced ... \$589 CHIPS 64K Ram Chips 9 for \$25

256K Chips..... each \$10

Compag 386 1 MB \$549

Compag 386 4 MB \$1795 8087-3/-2.....\$109/\$149 80287-6MHZ \$159 80287-8MHZ \$219 80287-10MHZ \$259 80387-16 \$359 80387-20

20 MHZ, 1 MG Memory Cache,

1.2 floppy, 40 MB (28Ms.), mono monitor. \$3449

SOFTWARE

MODEMS & FAXES

Hayes 1200/2400 \$289/\$419
Everex 1200/2400 \$79/\$149
Everex 2400 External \$199
US Robotics 2400 Int \$169
Sharp FO-300 Fax \$1149
Sharp FO-420 Fax \$1299

PRINTERS

\$169 LQ 500

LX 800

P

P

DFX 5000 \$1349 LQ 850 \$515 FX 850 \$339 LQ 1050 \$715 FY 1050 LQ 950 \$429 \$579 EX 800 \$379 LQ 2550 \$909 OKIDATA ML 320 \$339 ML 321 \$469 ML 390 \$469 ML 391 \$639 393....\$999 TOSHIBA 3

21 S/L / 341 S/L.	\$459/\$589
51 SX	\$885
N	EC
5200 \$539	P5300 \$699
2200 \$349	P9XL \$1049

IBM															
uietwrite	r III														\$ 119
roprinter	11														\$38
roprinter	X24														\$54
roprinter	XL I	Ш													\$59
roprinter	XL2	4													\$71

	н	EИ	v	L	E	7	7	ŗ.	.,	,	4	c	1	ĸ	A	,	3	C)	
aserje	i II																			\$1
aserje	t II	D																		\$3

	Laserjet II									\$1695
	Laserjet IID									\$3149
	1 MG Upgrade									. \$309
	2 MG Upgrade									. \$549
	4 MG Upgrade	١,								\$1199
	25 In 1 Font									. \$265
ı										

DRIVES & TAPES

Ext. 51/4" for PSII \$219	SEAGATE HARD DISKS
Ext. 1.2 for PSII \$219	20 MB for XT (ST225). \$269
Toshiba 31/3" 720K . \$99	30 MB for XT (ST238), \$289
Toshiba 31/6" 1.44 . \$105	40 MB for AT (ST251) . \$349
20 MB Tape \$339	40 MB for AT (ST251-1)\$419
40 MB Tape \$459	80 MB for AT \$589
101	MEGA
Bernoulli Box II 51/4" 20 MB	Int. w/card \$969
Dual 20 Ext. w/card	\$1769
Bernoulli Plus	\$3450
P	2115

Hard Card 20 MB . . \$529 Hard Card 40 MB . . \$649

VIDEO BOADDS

TIDEO DOARDS
ATI EGA Wonder 800 \$259
ATI VIP VGA \$269
Compaq VGA \$449
Everex EGA Autoswitch., \$159
Everex VGA \$239
Hercules Graphics Plus \$179
NEC MVA 1024 \$799
Orchid VGA \$289
Paradise Autoswitch 480 . \$189
Paradise VGA \$269
Paradise Professional \$469
Vega VRAM VGA \$499
Vega VGA \$269

MONITORS

III O I I I O I I O
NEC
Multisync \$579
Multisync Plus \$889
Multisync XL, 19" \$2149
MITSUBISHI
EGA \$399
Diamond Scan \$499
PRINCETON
HX12E \$449 Ultrasync \$499
SAMSUNG
Color/EGA \$229/\$339
Multisync \$439

Arlington Computer Products, inc. 3025-E.S. MALMO ARLINGTON HEIGHTS, IL 60005



FOR ORDERS & SYSTEMS QUOTES: 800-548-5105

> CUSTOMER SERVICE AND IN ILLINOIS 312-228-6333 SHIPPING 312-228-6333 TECHNICAL ASSISTANCE 312-228-1470

FAX 312-228-0516

Prices and Availability Subject To Change With

America's choice and Arlington Computer Products choice is EPSON°

It's not hard to understand why. Care in design, engineering and manufacturing have made Epson an industry leader and the industry standard. And to back their reputation, a one vear warranty stands behind every Epson product.

Arlington Computer Products is an authorized Epson® dealer, Please call for immediate delivery at very competitive prices.



Epson FX-850

 Narrow-carriage 9-pin, dot-matrix printer.
 SmartPark™ a unique Epson paper-handling innovation, lets you switch from fanfold to single sheets or envelopes without removing hardware

or paper With a standard push feed tractor and single sheet friction feed, the FX-850 can handle virtu-

ally any type of paper as well as envelopes.

Exclusive Selectype front control panel puts popular printer features and SmartPark operations at your fingertips. The FX-850 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI); 54 CPS in Near Letter Quality mode (12 CPI).



Epson FX-1050

 Wide-carriage 9-pin, dot-matnx printer.
 SmartPark. a unique Epson paper-handling. innovation, lets you switch from fanfold to single sheets or envelopes without removing hardware or paper.

· With a standard push feed tractor and single sheet friction feed, the FX-1050 can handle virtually any type of paper as well as envelopes.
Exclusive SelecType front control panel puts

popular printer features and SmartPark operations at your fingertips.
The FX-1050 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI); 54 CPS in Near Letter Quality mode (12 CPI).



Epson LQ-500

· Epson's 24-pm, dot-matrix technology creates true letter quality characters and high-resolution graphics
• Prints 180 characters per second (CPS) in draft

mode; 60 CPS in letter quality (12 CPI)

 Automatic single sheet loading, standard pull tractor and friction feed for versatile paper handling

 Exclusive SelecType front control panel offers quick, easy selection of popular typestyles, fonts

· Two resident, letter quality fonts - Roman and Sans Serif

· New "shadow" and "outline" print modes for use with desktop publishing applications



Epson LQ-850

- · Epson's 24-pin, dot-matrix technology creates
- true letter quality characters Epson's SmartPark "
- Exclusive SelecType front control panel offers quick, easy selection of popular typestyles, fonts and pitch · 264 Characters per second in the high-speed
- draft mode delivers outstanding productivity · 88 Characters per second in Letter Quality
- mode for enhanced, high-resolution characters . In draft mode or Letter Quality mode, the LQ-850 runs at a surprisingly quiet 55 dB noise level



Epson LQ-1050

- · Enson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark
- · 264 Characters per second in the high-speed draft mode delivers outstanding productivity · 88 Characters per second in Letter Quality
- mode for enhanced, high-resolution characters . In draft mode or letter quality mode, the LQ-1050
- runs at a surprisingly quiet 55 dB noise level Exclusive SelecType front control panel offers
- quick, easy selection of popular typestyles, fonts and pitch



· 24-Pin technology creates superior Letter Quality characters and high-resolution graphics up to 360 doi.

- · 7-Color printing capability is standard.
- · Epson's SmartPark · Exclusive LCD SelecType front control panel
- for easy selection of pre-sets, fonts and printer functions
- · 133 Characters per second print speed in Letter Quality mode (12 CPI).
- · 400 Characters per second print speed in draft mode (12 CPI)
- . Epson LQ ESC/P assures software compatibility.

EPSON

WHEN YOU'VE GOT AN EPSON. YOU'VE GOT A LOT OF COMPANY."

CIRCLE 336 ON READER SERVICE CARD Epson is a registered trademark of Seiko

Arlington Computer Products. inc. 3025-E S. MALMO
ARLINGTON HEIGHTS, IL 60005



Call: 800-548-5105

In Illinois 1-312-228-6333

Fax: 312-228-0516

Leprecard Disk Cards for PC & AT Computers

Shamrock's Leprecards feature the latest low power, high reliability disk drives and controllers. You can use them as the first or second hard disk in your system. Low power consumption means less strain on your system. You get a 1 year warranty, unlimited technical support, & our illustrated installation and user's guide. Take Two Models available for IBM PC/XT and compatibles, AT's and compatibles, as well as the TANDY 1000/A/SX/TX/TL/SL.

FREE SOFTWARE including TakeTwo, the backup utility PC MAGAZINE named Editors choice in 1986 & 1987, & LepreCache disk cacheing from Multisoft.

CAPACITY AVG. ACCESS	20MB 40ms	32MB 40ms	49MB 28ms*	65MB 16ms*
8 Bit PC/XT	\$299	\$319	\$549	\$649
16 Bit PC/AT	N/A	\$379	\$599	\$679

*Average access speed per partition. Tandy 1000/A/SX/TX/ Leorecards add \$20



Seagate PC/XT Disk Kits

- Pretested & formatted
- · Western Digital short slot controller
- · 30 page installation guide & reference manual
- · Cables, mounting screws, full & half-height face plates
- FREE! Take Two high speed backup software. PC MAGAZINE "Editors Choice"
- . FREE! LepreCache software by Multisoft
- 1 year Warranty, 30 Day Money Back Guarantee · Optional: 150 Watt, UL/FCC approved power
- supply for IBM PC's \$69



kits add \$20

30MB KIT \$299

eegate ST238 - 32.7MB/65ms/Half-Height/14.8 watts

65MB KIT \$499 Seagate ST277R - 65.5MB/28ms/Half-Height/11 watts

■ Seagate 20MB \$249 40MB \$349 Matched Pair Kits

Seagate Drive & Matched Controller

· 1 year factory warranty . 15% faster throughput than ST251 drive

LepreKeys

- · 111 Key enhanced layout Built-in Solar Powered Calculator
- Switchable Ctrl, Capslock keys · Double injection molded key caps
- · Removable function key template
- · ALPS tactile keyswitches as used by Northgate

100% PC/XT/AT/386 & Novell network compatible

286/386 Computers



SHAMROCK Computers give you the maximum in performance Our data crushing systems come standard with high perfor-

mance SCSI disk interfaces. This gives you the data transfer capabilities required by this high performance generation of systems. All our computers have 8 slot motherboards, room for 1 full and 3 halfheight drives, serial/printer ports, AWARD BIOS, clock/calendar, choice of 1.2 MB or 1.44 MB floppy drive, and LepreKeys Enhanced Keyboard with tactile switches and built-in solar calculator. Our 286 sys-

tems feature 12 & 16 MHz processors and 512K RAM standard, upgradable to 4 MB on system board. Our 386 systems offer 16 & 20 MHz processors and 1 MB

RAM standard, upgradable to 8 MB. A 64K static column RAM cache operating at 35 nanoseconds insure maximum processor performance. And don't forget that when you buy from Shamrock you get a 1 year warranty and 30 day money back quarantee

286 COMPUTERS -

STSTEM	SI V4.0	MIPS	PRICE	
tBM Model 50Z	11.2	1.6	\$2,995	
Shamrock 286-12/1 wait	11.8	1.9	\$ 799	
Shamrock 286-12/0 wait	15.3	2.5	\$ 888	
Shamrock 286-16/1 wait	15.9	2.6	\$ 899	

- 386 COMPUTERS -SYSTEM NORTON MIPS PRICE SIVAO

Compag 386-16 15.6 2.8 \$3.995 Shamrock 386-16/0 wait 187 28 \$1.799 Shamrock 386-20/0 wait 24.4 4.3 \$1,999 AT Disks

Seagate Drive with IBM AT rails & cables · FREE! OnTrack large drive soft

FREE! LepreCache & TakeTwo backup softwar Formatted Partitioned & Tested

40ms MFM 48MB \$359 ST251-1 30ms MFM 42MB \$449 ST277R 40ms RLL 65MB \$449 ST4096 28ms MFM 80MB \$599



733-AA Lakefield Rd. Dept. P. Westlake Village, CA 91361 to order or get our free catalog, call



(805) 379-9345

 No extra for Visa/Master/Discover (AMEX add 3%)

Prices include UPS surface shipping. Federal Express shipping just \$1.50 per pound

30 Day money back guarantee Corporate & Institutional P.O.'s accepted.

Call for our FREE CATALOG.

EPSON Rebate ALERT!

Through April 30 Only!

...Business to Business Can Deliver EPSON Printers Faster and More Cost Effectively.

Only Business to Business Offers the Exclusive One Year Replacement Warranty...

FACTORY REBATES ON ALL EPSON LO PRINTERS

Epson Rehate LQ-500 \$25 LQ-850 \$50 LQ-950 \$75 LQ-1050 \$100

Rebates good from Feb. 10th through Apr. 30th, 1989. Business to Business provides: dated-invoice, rebate form, serial number sticker - Everything you need to get your rebate FAST. All you do is mail it in!



LQ-500

· Creates high-resolution text and graphics 180 CPS draft mode; 60 CPS

Letter Quality
SelecType front control panel Epson's one year limited warranty

BUSINESS TO BUSINESS

One Year Free Replacement Warranty

We guarantee every product we sell to be free of defects as covered in the manufacturer's warranty, or we will replace it with a brand new one FREE for one full year. You only pay shipping and insurance.

"The response to our new one year free replacement warranty has been tremendous. For the first time a direct marketing company has addressed the major concern of direct buyers. "What do I do when I have a problem?"

Now Business To Business has answered that question decisively. If a problem occurs with any product you purchase from us anytime during the first year and it's covered by the manufacturer's warranty, simply ship it back to us and we'll immediately ship you back

> Jeffrey M. Kreps President

EPSON PRINTER SPECS

EPSON	Width	Speed	Price
LX-800	STD.	180/30 NLQ	\$177
LQ-500	STD.	180/60 LQ	\$262*
FX-850	STD.	264/54 NLQ	CALL
FX-1050	WIDE	264/54 NLQ	CALL
LQ-850	STD.	264/88 LQ	\$50 rebate
LQ-950	MEDIUM	264/88 LQ	\$75 rebate
LQ-1050	WIDE	264/88 LQ	\$100 rebate
LQ-2550	WIDE	400/133 LQ	CALL
	*Price afte	r factory rebate	9

Authorized Epson Customer Care Center

Panasonic KX-P1124 24 Pin Dot Matrix Printer Panasonic Width Speed Price KX-P1180 MEDIUM 192/38 NLQ \$187 KX-P1191 MEDIUM 240/48 NLQ CALL KX-P1124 MEDIUM 192/63 LO CALL KX-P1524 WIDE 240/80 LQ CALL

Why We're The BEST Direct Marketer in the U.S.

- ☑ Exclusive ONE YEAR Replacement Warranty ☑ 30 Day Return Privilege
- No Extra Charge for Credit Card
- Same Day or Next Day Shipping

a brand new one FREE."

- No Charging Credit Card Until Product Ships
- ☑ Factory Authorized Service Center
- Highest % of Products in Stock
- ☑ Customer Always told Stock Status before Ordering
- ☑ Knowledgeable Sales and Technical Staff

Business To Business'

Formerly PC Pitstop

4110 W. Lake St., Minneapolis, Minnesota 55416

24 Hour Fax Hotline: 612-920-3390

CIRCLE 355 ON READER SERVICE CARD

USA★FLEX Has Quality, Name-Brand Products at UNBEATABLE PRICES!!!

The Ultimate 286-1MEG

The Last Computer System You'll Ever Need!!!

- 2 serial ports
- 1 parallel port
- 1:1 hard disk controller w/diskcache Mouse port
- 101 keyclick keyboard
- 1.2 MEG floppy drive
- 12.5 MHz-faster than the competitor
- 16-bit EGA; operates at 12.5 MHz
- 3 expansion slots
- 180 WATT power supply



WESTERN DIGITAL

12" Monochrome Monitor System ^{\$} 1299
14" CGA Color Monitor System ^{\$} 1445
14" EGA Color Monitor

COMPLITEDS

CONFUTENS
T1000 4.77MHz, 80C88 CPU \$749
T1200 4.77/9.4MHz, 80C86 CPU\$2198
T1600 12MHz, 80C86 CPU CALL
T3100e 12MHz, 80286 CPU\$2696
T3200 6/12MHz, 80286 CPU\$3698
TEADO OUGUEL GOOGO ODLL SAEDA

FPSON PRINTERS

T5200 20MHz, 80386 CPU

LFS	OIA LUI	MIL	13
LX-800			\$176
LQ-500	USA★FLEX price Epson Rebate	\$286 -\$25=	\$261
FX-850	***************************************		\$338
LQ-850	USA★FLEX price Epson Rebate	\$518 -\$50=	\$468
EX-800	***************************************		\$399
LQ-1050	USA ★FLEX pnce Epson Rebate	\$718 -\$100 =	\$618
FX-1050	***************************************		\$449
LQ950	USA * FLEX price Epson Rebate	\$589 -\$75=	\$514
LQ-2550			\$918
DFX-5000			CALL
Hewlett-Packard Brand			
Toner Ca	rtridges		\$86
Hewlett-Packard Inkjet Cartridges			
for Deski	et Printer		16.95

Laser Printer

CALL



40 MB Tape Backup System			
Internal System	\$299		
External System	\$399		
•Requries DC2000 Data Cartridges•			
Sony DC2000 Data Cart\$1	7.49		

UNISON 600 600 WATT UNINTERRUPTABLE

POWER SUPPLY •600 WATT cortinuous power supply • Remote-on capability • Phone surge sup-pressor • Recessed light bar • Total power

available 1400VA \$499

MODEMS

With Communication Softwa	re
"desktalk" 2400 BPS Internal	
D1-24DTM	s99
"desktalk" 2400 BPS External	
	\$440

FAX MACHINES

SHARP FO220 \$	949	
SHARP FO420 \$1;	298	
MURATA M-1200 \$	674	
MURATA M-1600 \$	828	

System\$1549

MONITORS			
Magnavox 13"Mono White VGA			
7BM749	\$125		
Magnavox 13" RGB 8CM873	\$235		
Magnavox 13" EGA CM9043	\$339		
Magnavox 13" VGA 9CM062	\$369		
Magnavox 13" Mac II Color			
9CM080	\$475		
NEC 14" MultiSync 2A D1-NEC2A	\$499		
NEC 14" MultiSync GS D1-NECGS	\$239		
NEC 14" MultiSync 3D D1-NEC3D	\$649		
Zenith 14" Flat Tension VGA			
1490	\$598		

Save \$20 on any Monitor and Paradise Video Card Combination!!

KX-P11901 KX-P1524

PARADISE VIDEO CARDS







OUR PRICES ARE SO LOW WE CAN'T PRINT THEM!!

* CALL TOLL FREE 7 TO 7 MONDAY THRU FRIDAY - 9 TO 2 SATURDAY *

FAX# 312-351-7204 Customer Service and Technical Support Number 312-351-7172

CONDENSE PROFILED TO A SEMENUAL CORREST STATE OF THE PROFILED THE PROF

Clone 286: Computer of Choice

Clone 286 With

MONOCHROME MONITOR

System! 10MHz, 30MB HARD DRIVE

Clone 286 With

12MHz, 40MB HARD DRIVE, EGA MONITOR

Clone 286 With

16MHz, 65MB HARD DRIVE

VGA MONITOR



Standard Features of All Clone 286 Computers: 80287 Socket. 640K RAM (All RAM subject to a

- surcharge). • 1.2MB or 360KB Floppy Drive (Your
- Choice).
- 2 Floppy/2 Hard Disk Controller, 1:1 interleave.
 Clock Calendar with Battery
- Backup.

 System Reset Switch on Front Panel.
- 1.44MB Floppy Capability.
- Enhanced 101-key Keyboard.
 Keyboard Lock.
 Fully Expandable.
 - · One Year Parts and Labor

 - One Year Parts and Laure
 Warranty
 Novell Compatible.
 I Parallel, I Serial, I Joystick Port.
 PC-Write QModem ExpressCale
 AutoMenu HomeBase Money
 Master Findex Clone Utilities.
- FCC Certified. VALUE CHART | MONOCHROME | COLOR | VALUE CHART | Revolut | VGA | CGA | VGA | V

\$1879 1979 2879 2379 2379 \$1979 2879 2179 2479
2879 2379 51979 2879 2179
2379 31979 2879 2179
\$1979 2879 2179
2079 2179
2079 2179
2179
3479
2679
\$1179 2279 2379 2479

Buy with Confidence! Our Guarantee Removes All the Risk from Your Buying Decision!

AND I T T I IN THE POLITICAL TO THE POLITICAL DESCRIPTION OF THE POLITICAL



THE CLOSE ALLOHE TOUR DAYING DECISION.

The Close Warrany is imple and straighdrown. It was bey olays after recept of your Close to seed you and it are going to be companishe. If you are contained with your Close from any recent work with that time, you may return damage or lose anything that was in the original container, which also must be returned. You can void your warranty by falling to exercise commit care when hooking up or operating your Close. Complete warranty details are evaluble or negats.

SERVING YOU SINCE 1980



Standard Features:

8 8088 @ 4.77 - 10MHz Torbo-speed 8015 © 477 - 10MHz Torbo-speed Maioboard — 600R RAM standard (All RAM subject to surcharge) — 600 Per Supply — 600 Per Supply

MODEMS

TURBO CLONE



CLONE COMPUTERS • 2544 W. Commerce St. • Box 223957 Dallas, Texas 75222-3957 • Telex: 882761 • Fax: 214-634-8303

For information or technical assistance call 214-637-5400 91999 by Clone Computers. A9 rights reserved. Prices and specifications subject to change without motion. All prices are in U.S. Dollars. Payments must be in U.S. heads drawn on a U.S. bank.



CIRCLE 252 ON READER SERVICE CARD

HOURS:

7 AM to 7 PM Monday-Friday 8 AM to 2 PM Saturday Call on Sunday



Visa, MasterCard. Discover and American Express Accepted.



IRM-NOVELL **Network Support** \$85/Hour

COMPAG Laptop SLT 286 20/40 Mb \$3800/\$4200

CON CON IBM MUL PAC

IBM PGS SAM ZENI

CON CSA HIT IBM MIT NEC NEC ZEN

SAW

COMPAG AGCM Monitor \$1399

TOSHIBA T3200/40 Laptop \$3500

1% Consultant and Reseller Accrual Program (\$52,485 paid in 1988)

	1-800-634-8215	
1	IBM PS/2	
l	Model 25—Color Model 30—286 20 Mb Olsk	\$1250 \$1810
ı	Model 30-20 Mb Disk	\$1585
١	Model 50-20 Mb Olsk	\$2700
ı	Model 50—60 Mb Disk Model 60—44 Mb Oisk	\$3120
ı	Model 70-60 Mb Disk	\$3800 \$5300
ı	Model 70-A21—120 Mb Disk	\$7800
l	Model 80-70 Mb Disk	\$4800
l	Model 80—314 Mb Disk	\$8200
l	IBM PS/2	\$1670
ı	286 Mod 1/640 K 286 Mod 1/40 Mb-640 K-Monitor 386 Deskpro/20 130 Mb 386 Deskpro/20 300 Mb	\$2200
ı	386 Deskpro/20 300 Mb	. \$8000
ı	386 Deskpro/20 300 Mb 386 Deskpro/20 40 Mb/110 Mb 54/4 386S Deskpro 2004 Mb/110 Mb 54/4 386S Deskpro 200hl/40/Mb 386/25 110Mn/300Mh 586/25 110Mn/3	\$2500
۱	386S Deskpro 20Mb/40Mb \$30 386/25 110Mb/300Mb \$68	000/3500 000/8900
۱	Portable II Model 4	\$2500 \$3400
ı	Portable III Model 40	. \$4050 \$5400
ı	Portable 386 Model 100	\$6800
I	TOSHIBA LAPTOP	SUU/4300
ı	T1000 T1200F8 T1200H8 T1200H8 T1600 T3100/20e T3200 T5100 T5200 40 Mb/100 Mb \$66	\$775 \$1585 \$2399 \$3250 \$2800 \$3500 \$4100
۱	T1200H8 .	\$2399
I	T3100/20e	\$2800
١	T5100	\$4100
ı	T5200 40 Mb/100 Mb \$66 ZENITH LAPTOPS	JUUIOOUU
Į	ZENITH LAPTOPS 286/20 Super Sport 386/40 Turbo Sport	\$3300 \$5400
ł		
ı	386 System. 286 System. 8088 System	\$2600 \$1200 \$795
ı	8088 System	
i	DISK DRIVES SEAATE 20 Mb Kit SEAATE 30 Mb Kit SEAACTE 40 Mb Kit XT TOSHIBA 1.44 Mb Roppy PROCOM Ext 5.25" for PS/2 CDMPA0 1.44 1/3 HT	\$259 \$295 \$366
ı	SEAGATE 40 Mb Kit XT .	\$295 \$366
ı	SEAGATE 80 Mb	\$639
ı	PROCOM Ext 5.25" for PS/2	\$439 \$639 \$125 \$290
ı	COMPAO 1.44 1/3 HT	
ı	MINISCRIBE 20 Mb	\$379
ı	PROCOM 30 Mb/40 Mb	\$429/519
ı	Hardcards MINISCRIBE 20 Mb PLUS 20 Mb/40 Mb Hard Card. PROCOM 30 Mb/40 Mb PROCOM 45 Mb for PS/2 MAYNARD 20 Mb	\$Call
ı	CANON FAX 8	. \$800
ı	CANON FAX 20	\$1050 \$1725
ı	MURATA M1200 MURATA M1600	. \$Call \$899
ı	SHARP F0220/F0300 \$1	950/1159
ı	TOSHIBA 3010	\$1275
	TOSHIBA T3300	\$1199
	CANON FAX 8 CAMON FAX 20 CANON FAX 20 CANON FAX 20 MURATA M120 MURATA M120 SHARP F0220/F0300 SHARP F0220/F0300 SHARP F0220/F0300 SHARP F0220/F0300 T0SHBA T39100 T0SHBA T39100 T0SHBA T3900	\$40
	CANON PC3 CANON PC6RE CANON PC7 Toners	\$1500 \$40 \$369 \$1000 \$1100 \$70-120
	CANON PC6RE	\$1100
i	TARE	
ı	IBM 6157 for PS/2	\$1350
ı	IBM 6157 for PS/2 IRWIN 40 Mb InVExt MAYNARD 60 Mb XT/AT InVEX1 MAYNARD 60 Mb for PS/2 MOUNTAIN 60 Mb	\$675/881
ı	MAYNARD 60 Mb for PS/2 MOUNTAIN 60 Mb	\$1199

ONOCHROME MONITORS	ARCNET Active Hub . \$469 Ethernet Terminators . \$38
NEW 210/410 \$70/145	Ethernet Terminators \$38
ADAO Mono Ambar/Green \$210	Novall trained & authorized sales & support.
APAO VGA Mono \$210	
PAO Mono Amber/Green \$210 PAO Mono Amber/Green \$210 PAO YGA Mono \$210 PS/2 8503 \$200 TISYNC GS \$195 KARD BELL Amber/Green \$85	tBM
TISYNC GS \$195	IBM Adapter Card \$450
KARD BELL Amber/Green \$85	IBM 8wk Expander \$425 PC Lan Program \$150
COLOR/EGA MONITORS	PC Lan Program \$150
20141425	TERMINALS
DEK C600/C722 \$344/435 PS/2 8512 \$435	WYSE 50 Amber or Green \$370
UltraSync . \$500	W/VSE 60 Amber or Green \$295
ASIING RGR \$245	WYSE 60 Amber or Green . \$295 WYSE 85 \$394
ASUNG RGB \$245 IITH 1390 \$405	SOFTWARE
VGA/CAD MONITONS	Aldus Pagemaker \$459
MPAD AGCM Monitor \$1399	Auto Cad 10.0. \$2200
MPAU VGA Color \$520	COMPAQ DOS 3.31 \$89
1016 \$1779	dBase IV \$455
ACM 4119 \$2200 PC/2 8512 \$515	DisplayWrite IV \$285
PS/2 8514 \$1075	IBM DUS 3.3/4.01 \$90/110
VGAICAD MONITORS PRID ACCM MONITORS PRID ACCM MONITOR PRID VGAICATOR PRID VGAICATOR PRID VGAICATOR PRID STATE PRIZ 8514 5105 PRIZ 8518 5105 P	IBM US/2 Standard 1.1 9233
MultiSync XI \$2070	Letter 1 2 2 1/ 2 01 61//216* \$202/200
MultiSync Plus \$879	Lotus Symphony \$420
MultiSync 2 . \$575	Multimate Advantage 2 \$259
ITH 1490 \$819	Norton Advanced Litilities \$75
NETWORK	Paradox 2.0. \$418
VELL	Smartcom II/III \$90/150
ANTA CLARA Diskless Workstation \$631	Alous Pagemaker \$459 Auto Carl 10.0 3.3 \$200 Auto Carl 10.0 5.3 \$200 Auto Carl
VESTERN DIGITAL 3 Node LAN kit	Word Perfect 5.0 \$225
w/Western Digital software . \$700	LASER PRINTERS
ntry-level 286 Starter Kit. 4 Users . \$470	HP OeskJet \$665
OVELL 286 Software w/Keycard . \$1500	UD Locar let H/HO with toper \$1675/2075
QVELL 286 Software V.212 \$1939	UP Cose let \$1075
OVELL 286 Software V.212 . \$1939 OVELL SFT Netware Level I \$2120	NFC 1 C890 \$3244
OVELL SFT Netware Level II V2.1 \$2740	PANASONIC KX4450 \$1590
Level II V2.1 \$2740	HP ScanJet \$1075 NEC LC690 \$3244 PANASONIC KX4450 \$1590 TOSHIBA PageLaser \$2499
londedicated Netware Software 286	PRINTERS
w/Keycard \$1470	
NTERFACE CARDS	Epson
ARCNET PC110 LANBoard PS2 \$520	FX 850 260/84 cps \$345° FX 1050 260/84 cps \$510°
ARCNET PC110 LANBoard \$185 ARCNET PC210 LANBoard \$235	EX 800 300/60 cps \$459
ARCNET PC210 LANBORRO \$235	LQ 850 264/88 cps. \$510
ETHERNET Interface Connector \$325 ETHERNET Plus Board (for 286) \$690 G-NET Interface Card w/cable \$294	LO 1050 264/88 cps \$745
G NET Interface Card w/cable \$204	LO 1050 264/88 cps. \$745 LO 950 \$Call LO 2550 \$929* OFX 5000 \$1399
WESTERN DIGITAL	LO 2550 \$929*
WESTERN DIGITAL Ethernet Cards \$260	OFX 5000 \$1399
ACCESSORIES	Okidata
ARCNET Passive Hub \$80	320/21 \$365/477
Anotte i ressive ned 300	1 320/21 . 3303/4/7

"We Will Best Any Price"... Dick
1-800-634-8215
In Illinois Call...
1-312-654-4100

SALES AND QUOTES (Outside Illinois): 1.800-634-8215 SHIPPING AND TECHNICAL SERVICE: 1-312-654-4170 QUOTE-A-FAX: 1-312-325-4969

 Corporate and volume purchases invited. Call Dick · Lease available.

- 24 hour burn in on all CPUs.
 Stock orders placed by 3:00 CDT shipped same day.
- 100% financing available.

- Credit card and CDD purchases subject to verification.
- International orders welcome. Prices subject to availability and change without notice
- · Prices reflect 3% cash discount
 - · Allow 10 days for personal
 - · Wire transfer accepted. Minimum \$5.00 shipping/ handling charge
 - · Restocking charge on returns.
 - · Prepay and take 1% discount
 - . Educational P 0.'s welcome. · Fraud aggressively prosecuted

	390/91	
	393	\$980
į	Panasonic	
	KX 1180 192/38 cps	\$185
	KX 1191 240/48 cps	. \$249
	KX 1191 240/48 cps	\$320 \$319
	KX 1595 240/51 cps	\$445
	KX 1524 240/80 cps	\$540
	KX 1524 240/80 cps . KX 3131 17 cps LO .	\$290
	KX 3151 22 cps LO	\$461
	NEC	
	P2200 170/55 24 Wire	\$339
	8850 55 cps P5200	\$1125
	P5200	\$507 \$705
	P5300 P5XL 290/100 cps	\$829
	P9XL 400/140 cps	\$1025
	Color Option	\$118
	Quickwriter Quietwriter III Proprinter III Proprinter XL 24	SCall
	Quietwriter III	\$1125
	Proprinter III	\$485
	Proprinter XL 24	\$709 \$645
	Proprinter III XL	3040
	COMMUNICATION	4/

EMULATION	
IBM PS/2 50-80 5250 Emulation	\$675
IBM PC XT/AT 5250 Emulation	\$675
AST PC XT/AT 5250 Emulation	\$575
IBM PC XT/AT 3270 Emulation	\$450
IBM PC XT/AT 3278/9 Emulation	\$490
IRMA Board	\$Call
US ROBOTICS 1200 Int	\$100
US ROBOTICS 2400 Int .	\$159
HAYES 1200B Int/SCII .	\$243/282
HAYES 1200 Ext	
HAYES 2400 Ext	\$419
HAYES 24008 w/SCII Int	\$418
	\$75
EVEREX 2400 Int/Ext	
VENTEL 1200/1200+	\$190/228
VENTEL 2400/2400 Ex1	\$290/380

VENTEL 2400/2400 Ex1 \$29	00/380
MULTIFUNCTION CAR	DS
EVEREX MagicCard OK	\$100
AST 6 Pack w/384K	\$Call
AST Advantage/2 for PS/2	\$Call
COMPAN 1Mb Memory 386/20 & 20F	\$650

VIDEO BOARDS	
COMPAO AG 1024 Board	\$1049
COMPAQ AG Memory Board	\$425
COMPAQ VDU	\$145
COMPAO VGA	\$419
GENOA Super HI Res 800X600	\$175
GENQA Super VGA	\$310
PARADISE Auto Switch-480	\$195
PARAOISE VGA.	\$275
RP MonoGraphics	\$69
VEGA Deluxé	
VEGA VGA	. \$275

CHII	PS
ntel	
8087-1/2/3 80287-6/8/10/A 80387-16/20/25/SX	\$220/149/109 \$167/220/259/355 \$450/565/720/440

Seytronics 101 Keyboard	\$100
Printer Cable 6710720	\$20/25/60
Outlet Surge Protector	\$25
MICE	
OGITECH HIRAS	\$95

OGITECH HiRes			
OGITECH C7 Serial			
OGITECH 8us			
EXXA Mouse			
Aicrosoft Mouse			

DON'T SETTLE FOR LESS ...



24 pin, 192 cps draft, 63 cps LQ 5 built in fonts

- front, bottom or rear paper feed

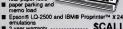
Swan Modems

w/PC Talk III software

internal \$129 1200 baud

■ 2 year warranty \$CALI Also... New 1180 &1191 \$Call

Swan
Technologies











LASER PARTNER ■ 11 Pages per minute

■ 300 Dots per inch ■ 5 Printer emulation m

WAS \$1375 Two 250 sheet cassettes

\$599





2400 baud external \$149

1200 baud external\$99

- Uses 62% less
- desk space
- ideal for EGA & VGA
- Lightweight Design with Tactile Feedback



SCAN MAN



\$199



- Tilt/Swivel Base
- Analog Input Allows Virtually Unlimited Number of Colors

HARDWARE

PC ADD ON BOAL BOCA RESEARCH

I/O Card XT or AT .. INTEL boveBoard Plus boveBoard Plus I/O nBoard 386

TOSHIBA LAPTOPS

.....\$1369 MB) \$3599 T1200 (10MHz) T3200 (12MHz/40 Call for other Toshiba mode



RDS	intal CHIPS
CALL	
\$79	8087\$89
\$/9	8087-1\$169
	8087-2
SCall	80287-8\$199
SCall	80287-10\$229
.\$799	80387-16\$369
ing	80387-20\$419

MICRON Ram Card (MB-28-DH) populated w/ 2MB RAM... TOPS

ACCESSORIES

ACCECCOIN	
CURTIS Ruby/Ruby + Dismond/Diamond + Sate Strip Switch Box Curtis Clip CCI	\$30/\$35 \$17 \$30
SWAN Surge Suppressor 6/10' Printer Cable 8' Rt. Angle Printer Cable	\$14

Call for Quote

\$219/\$259

FLOPPY DISK DRIVES 3.5° (720K) 3.5° (1.44MB) MITSUBISHI ROCTEC 5.25 * QTY. 360K 1.2MB 1-3 \$74 \$89 \$74 \$89 \$62 TOSHIBA

PC HARD DRIVES

KAŌK KL320 20MB (40 ms) Bare/Kit KL330 32MB (40 ms) Bare/Kit

MiniScribe

8438 30MB (68 ms) \$299 3650 40MB (61 ms) \$299

Seagate Seagate	
T-225 20MB (65 ms) Bare/Kit	\$219/\$2
T-238 30MB (65 ms) Bare/Kit	\$249/\$2
T-125 20MB (40 ms) Bare/Kit	\$249/\$2
T-151 40MB (40ms)	\$4

ST-251-0 40MB (40 ms) ST-251-1 40MB (24 ms) ST-4096 80MB (28 ms).....

Kits Include cables, controller and mounting screws

EDUCATIONAL and CORPORATE ACCOUNTS chase orders CALL 1-800-468-9044 ed corporations end institutions FAX: 814-237-4450

To order: No surcharge on biscower, visa, MasterCard or AMEX. "Your credit card is not charged until your order is shipped iff COD orders accepted with no COD (see III We insure your order at no extra cost to you. If Shipping: 3% or 55 minimum for UPS Ground. Call for shipping charges on Express Air, APO, FPO, AK. HI and all foreign orders. III Mall Orders: We accept money orders, certified checks, and personal checks. Allow 2 weeks for personal and compony checks to clear

Defective items replaced or repaired et our discretion. PA deliveries add 6% sales tax. Prices and terms subject to change without notice

We accept purchase orders from qualifications. MMC





per box of 10 3.5" 5.25" BONUS DS-DD \$6.95 MAXELL DS-DD \$19.95 \$9.95

tcp ships it

CITIZEN

NEC P2200 (170cps, 80 col. 24-pm) P5200 (265cps, 80 col. 24-pm) P5300 (265cps, 132 col. 24-pm)

TOSHIBA

120D (120 cps/9-pin) 180D (180cps, 80 cot. 9-pin) ... MSP-40 (240cps, 80 cot. 9-pin) MSP-45 (240cps, 132 cot. 9-pin) MSP-55 (300cps, 132 cot. 9-pin)

Premier 35 (Dateywheel)
Tribute 224 (200cps, 132 col.24-pi

HEWLETT-PACKARD

LASER PRINTERS

■ 11 ppm/Dual Bins ... \$1375

cript ... \$3349

\$274

HEWLETT-PACKARD Laserjet Series III

8 ppm/512K ...

PANASONIC

QUME

EPSON

tcp Price Epson Reba Your Price

LQ 500

Deskjet (240cps, 80 col) Paintjet (187cps, 80 col)

\$449 \$Call

PRINTERS

\$179<u>\$</u> PANASONIC 1001111







MICROSOFT

ez (320dpi) Mo

PC Mouse II. LOGITECH

MSC TECHNOLOGIES

Panasonic

1191 (240cps, 80 col. 9-pm) MEW SCall 1124 (192cps, 80 col, 24 pm) ____ \$Call \$389 \$469 1592 (180cps, 132 col. 8 pin)

1595 (240cps, 132 col, 9-pin) 1524 (240cps, 132 col. 24-pin) .

EPSON FX-1050 (264cps. 132 col. 9-oin) for LQ-500 (180cps 80 col. 24-pin) ...

LQ-850 (264cps 80 col. 24-ptn) Price LQ-1050 (264cps, 132 col, 24-pin) on LQ-2550 (400cps, 132 col, 24-pin)Epson Call for EPSON LQ Rebate Offer!

Sitale* NX-15 (120cps, 132 col, 9-pm) \$345 NX-2400 (170cps, 80 col, 24-pm) \$Cel

OKIDATA







EAYES Smert Modern 1200 beud Internal \$259 2400 beud Internal \$Call	
PRACTICAL PERIPHERALS 2400 baud Internal\$149	
2400 baud External	
1200 baud External	

Multi Fine II	\$169
SWAN	
EGA	\$149
VGA	
ATT WAS Minuted	\$Call
ORCHID	
	\$269
Pro Designer VGA	\$319
Pro Designer VGA +	SCall
PARADISE	
Paradise VGA +	\$269
VGA Protossional	9Cell
SWAN	\$249
VIDEO 7	02.10
VEGA VGA	\$279
ACOL AND PROPERTY.	
MISC.	
ATI	
Graphics Boldison (News)	DOM . \$169
HERCULES	
Graphics Phill (Hone)	\$179
In-Color Card (DOA)	\$299
SWAN	
Selichable (Mesurcas)	\$69



н	RGB/CGA
	Megnevox 8762\$249
	Magnavox 8515
	Samsung SC452C\$219
	EGA
	Imtec 1453 \$349
	Magnayor 8053 \$346
	Megnevox 8053\$349 Packard Bell 1431\$419
	EGA Multisync
ı	Imtec 1455N Multi\$419
	Mitsubishi Diamond Scan \$Cell
П	NEC Multisynce II\$599
П	NEC Multieync Plus
	Sony 1303\$449
ł	VGA
	V CAR

OPEN: 8:00AM-11:00PM Mon-Fri, 10:00AM-8:00PM Sat, 12:00PM-8:00PM Sun EAST COAST TIME



Software orders over \$100 and Accessories under 6 pounds will be shipped Federal Express

(Even at these prices) You only pay TCP's standard shipping charge. Orders arriving before 4:00 PM our time will be shipped out same day. If part of your order is backordered the remainder will be shipped UPS Ground



SECURITY SECURITY

Your Credit Cerd is not charged until your order is shipped.

We insure your order at no extre cost to you

Tussey is e linencially strong end well established company.

CUSTOMER SUPPORT

- After sales support
 Knowledgeable staff, all graduates of Tussey's "Computer Bool Camp". Our advanced warehouse/materials
- handing system assures your order is shipped out eccuretely & on time.

 Our IBM AS400 ellows instent order and inventory status

AMERICAN Design CAD 3.0 or 3-D .. \$155 ASHTON-TATE dBase III+ dBase IV \$459\$99 ...\$129 ...\$429 ...\$159 8) ..\$57\$136\$99 ...\$159 Turbo Pascal 5.0.

Turbo Basic
Turbo C 2.0
Turbo C Professional
Turbo Asmbir/Debug
Turbo Lightning
Turbo Pascal Prol
Turbo Prolog 2.0
Turbo Prolog Toolbos
Turbo Turbo Turbo .\$99 .\$61 \$159 BEDFORD

\$135 BRODERBUND Print Shop\$33 Print Shop Companion\$29 CENTRAL POINT \$19 Copy II PC..... Deluxe Option Board PC Tools Deluxe 5.0 \$99 CHIPSOFT Turbo Tax \$49 . \$79 DAC SOFTWARE
Dac Bonus Pack
Dac Bonus Pack
Dac Easy Accounting
Dac Easy Light
Dac Easy Payroll
Lucid 3-D
Call for Pricing on Tuto \$59 \$39 \$59 FIFTH GENERATION

FORESIGHT Draftx CAD Ultra FOX .\$199 Forbe FUNK GENERIC SOFTWARE Gen CADD Level 1,2 or 3 . \$Call INTUIT

Quicken . MECA Managing Your Money ... \$129 Tobias Tax Cut \$47

MERIDIAN Carbon Copy Plus MICROPRO

LOTUS 123 Microsoft

\$64 \$219 \$297 \$32 \$290 earning DOS IS-DOS/P

PETER NORTON Norton Commander Norton Utilities Norton Advanced Utilitie QUARTERDECK DESQView DESQView 386 REFERENCE SOFTWARE SAMNA

SOFTVIEW SOFTWARE PUBLISHING
First Publisher \$74
First Publishing Fonts . \$Call
Harvard PM 3.0 ... \$Call
Harvard PM 3.0 ... \$Call
Harvard Graphics ... \$Call
PFS First Choice 3.0 ... \$99
Professional File ... \$124
Professional Plan ... \$59 First Publisher
First Publishing Fonts
Harvard PM 3.0
Harvard Graphics
PFS First Choice 3.0
Professional File
Professional Write
Professional Write

SYMANTEC

THREE D GRAPHICS WORD PERFECT \$294 \$125 Library Word Perfect 5.0 XEROX

ra Publisher 2.0 CIRCLE 268 ON READER SERVICE CARD





Special I

CompuGUARD SAVE UP Anti-VIRUS ... \$75 TO 70% **Best Buy**

SINCE 1984

see Floopy Drives



PRODUCTS NOT LISTED ... CALLI

PC & MAC

1-800-621-3999 New Orders:

AST Premium 286/386

Call

ZENITH 1490 FiatScreen \$579 DESIGN CAD

Standard or 3D

\$145

SOFTWARE (cont.)

Littre 1 Plue or 3D Modu Call

DRAFIX

SMART MODEM 2400R Int. \$115 \$59

MITSUBISHI AT 40Mb Disk Diamond Scan PANASONIC

1124

Call

VENTURA PUB 2.0 \$457

MAKER Call

SCANNERS \$155

Summagraphics Mac 12x12 Tablet \$269

PRINTERS & LASERS

| Call | 1124 314 1191 ...

MONITORS

lek 1280 & Card 639 thersCall ton Ultra Syno 485 Princeton Ultra Sync 486
Sarmsung Call
Signra Designs LaserView 1198
19° AT/PC 1499
19° AT/PC 1499

SOFTWARE

398

Freelance Plus 283
Fox Base Plus 179
GEM Draw Plus 159
Generio Cad Level III w/Dot 129
Generio Cad Others Cal
Harvard Graphics 265

 PageMaker 3.0
 Call

 Paradox 2.0
 316

 Paradox 3.0
 446

 PC Tools Deluxe
 Call

 PathMinder 4.0
 65

 Peachtree Accounting II
 145

Q&A Write115

Quicken 29
Rapid File 172
R:Base for DOS 415
ShipMate¹¹⁶ (ups Manifest) 199

Kick Plus117 rart Syamen 416

uattro.....149

WindowsCall WordPerfect 5.0213

Pre-approved P.O.'s are welcome. Prices reflect cash discount and are subject to change without notice. Product com-sathlifty, warranties, & claims are responsibility of manufacturer only. All returns are subject to a restocking (see, Per-cond/Company Decksid selley shipping, AZ orders only add 6.7% tax. Orders are processed same Day. International orders

DIGITIZERS & PLOTTERS

 Drawing Brd 12x12 16-Bin
 .see

 Inter Sweet-p 600
 .598

 louston instruments
 DMP 62

 DMP 52MP
 .Call

 DMP 52
 .Call

Kurta IS 12x12285 iurta IS 12x12 IS 12x17 Jurranagraphics 12x12 Plus 18x12 Pro w/4 Butt & Stylus ... Mac Bit Pad 12x12, 4But, Sty



HELPERS / SCANNERS

WANTED
Original Programs - utilities
applications, etc. Earn

royalities in just 90 days. Mail or Fax your info to attn: Bill MS-DOS & MAC compatible only

DRIVES, MODEMS & FAX COMPUTERS **HITACHI Digitizer** 10 Year Warranty

Fujikau 3.57 720k Drive 184 Milaudishi AT 4004 Mih Hard Drive 197 Dri ht 1, 26m 197 ht Puma Pro 12x12
(replacing Tiger Tablet)
4-Bin Cursor, 1-Bin Pen
& Mouse Emulaior.
\$339

\$175

US Robotics Call

BOARDS & NETWORKS

9-Com Etherlink Call
Adage AD 10/4 Call
AD 10/8L Call
AD 10/8L Call
Archet Call
Aries Call

ATI EGA Wonder 189
VIP VGA 240
Copy II Opt Board Dtc 95
EtherNet Pius Call
Genos VGA 760x1024 379
Hercules Graphics Pius 169
Intel AboveBoard 2804512k 359
AboveBoard 2804512k 368
Paradise EGA 480 Call
VFA Pius Call

 Paradise EGA 45U
 Call

 VGA Plus
 Call

 VGA Plus 18
 Call

 VGA Pro
 Call

 Sigma Designs VGA
 209

 Tops Flashcard
 143

 Value
 Call
 Verticom Call Video 7 Vega Deluxe 177

Clones 286/386 Call

It PAYS to BUY- MHI!

> Service You Expect II Volume Bids

Wecomel VISA

MASTERCARD PO's Just Call First.

385 Model 300 2475
Mhsubishi MP286L Call
NEC Multispeed 988
Multispeed EL II 1423
Multispeed HD Multispeed HD 2209
Toshiba Laptops Call
T1000 789

Intel coprocessors

Genuine & New 8087-2 80287-8 80287-10 105 80387-20 Call 80387-25 529 80387-3X 349 80C287A (for Laptops)

MOUSE

 Logitech C7 Serial or Bus
 64

 HiRez Bus
 76

 HiRez Serial
 Call

OPTICAL

DataBase Special

dBase IV ... 449
FoxBase Plus ... 179
Paradox 3.0 ... 446
Rapid File ... 175
Rbase for DOS ... 415
Q & A ... Cal
Quattro ... 149

MHI Warehouse, Inc. 8129 N. 35th Ave. #2-306 Phoenix, AZ 85051

1-800-621-3999 Order Info: 602-997-8877 Fax: 602-943-3833

COMPUTER DISCOUNT WAREHOUSE SAMSUNG 8-330 4 77716 MHz, 640K, 00\$ 3.3, Enhanced Keyboard \$-330, 1 Floppy \$-330, 20 Meg/40 Meg S-330, 20 Meg/40 Meg ... 974.95/995.82 S-550 AT Compatible B/12 Mit, 8 Sets. 25/PC, Belli-in EGA, DOS 33. Enh. Knyboard S-550, 1.2M Floopy ... \$1220.45 \$-550, 20 Meg/40 Meg ... 1569.80/1895.45 **EPSON** DFX5000 EPSON REBATES EX800 up to \$10000 EY850 through April 30th FX1050 odem....PRICING Call Now! LX800 LQ850 LQ1050 LQ950 LQ2550 AST SPECIALS SANTA CLARA Diskless Workstation SOFTWARE & STARTER KITS



MOST ORDERS SHIPPED WITHIN 48 HOURS.

HIGH VOLUME BIDS INVITED

If you find a better price call us before you buy.

WHY WAIT? CALL COMPUTER DISCOUNT WAREHOUSE™ NOW!

See 750-750 551 Mon-Fn chch Support 750-550 551 Mon-Fn

MICROCOMPUTE MARKETING COUNC of the Detect Marketing Associated II

In Illinois FAX (312) 498-1426 (312) 291-1737

MEM

мемвея 😝 в4



Zenith is closing out this line of advanced personal computer systems. We've obtained them & can now offer them to you at UNBELIEVABLE SAVINGS!!

- 20 MB Hard drive. 640 K. One 720K 3-1/2" disk drive.
- · 8088 16 bit microprocessor at 7.16 MHz. • 84-key keyboard. IBM compatible
- · 14" high resolution black & white monitor. . CGA compatible.
- · High resolution graphics: 640 x 200 · Serial & parallel interfaces Mouse port. • Includes a 300/1200
- baud modem & 9-pin serial port. Includes following software: MS-DOS 3.2. MS-DOS Manager, GW-BASIC & CPC communications software.
- Dim.: 13"W x 14.5"H x 11"D (without keyboard). . Model #: EZPC 20 plus FZA1 ungrade
- One Year Warranty! Factory New! Factory Perfect!

ILITY SOFTWARE PKG by MIGENT Brachics Word DAMARK \$39

Manufacturer's Suggested Retail \$1,999.00 DAMARK PRICE:

FOR FASTEST SERVICE CALL TOLL FREE 1-800-950-9090



DAMARK INTERNATIONAL, INC 5707 Shingle Creek Parkway, Minneapolis, MN 55430 Customer Senace • 612-566-4940

ZENITH XT Turbo Computer(s) @ \$799 each, plus \$29.00 s/h each, No. B-1225-116525

ABILITY Software @ \$39 each, plus \$5.00 s/h each. Item No. B-1225-116218. MN res. add 6% sales tax

City State Zin ☐ Check/MO ☐ VISA ☐ Master Card ☐ Discover

Ph. s (

DELIVERY TO 48 U.S. STATES ONL CIRCLE 483 ON READER SERVICE CARD Your #1 Source Products COMPUTERS -- - DRIVES/TAPE --AST Premium CALL Miniscribe Drives CALL CALL Print Drives Fuerey Sten CALL CALL Seagate Drives
CALL Bernouth Box II NEC Multiproped CALL rsung XT/AT/386 CALL Archive XL 40MB Tope CALL Everex 60MB Tope 339 CALL Shorn I gottone - PRINTERS Alps Allegro 24 Epson LX800 359 185 OTHER HARDWARE son FX/LQ/mv CALL Murato 1200... CALL NEC P2200/5200 1049 259 Sharp FO 550 CALL Panasonic Fax Board Panasonic All Models 650 OMS PS810 Laser 1479 Complete FAX 9600 Crystal Print II Logitech Scanman 400 226 lerox 4020 color Evercom 24+ Haves Moderns CALL - BOARDS -275 Datacopy 730 . . . 315 Kurta Digitizers Paradise VGA Plus 1099 Prodesigner VGA EGA Wonder 800 239 Summasketch Plus 309 Roland DXY1100 Quiner MCA V-RAM VGA Sweet P600 499 153 Amdek Smart Scan Diamond Scan 14 TOPS Floshcard 509 AST Rom Cords CALL Multisync 2A Above Board Plus 419 Princeton Ultrasync 499 Moch 20 Turbo 329 Sony 1302P SOFTWARE - ACCOUNTING - - SPREADSHEETS 249 Framilwork III Acc Pric BPI CALL dford Int Accounting Doc F7 Accounting 59 Microsoft Excel 245 Open Systems CALL WORD PROCESSING Tax Prep SW — DATABASE — AMI.

Microsoft Word 5 95 CALL Advanced Revelation 469 Multimate Advantage II. Ask Som 175 PFS First Choice V3 89 50 CALL Rightwriter 129 DB XL Diamond. 205 Wordstor Pro 5. 249 Xywrite III + For Bose + 239 Lotus Agenda Rapid File 185 - UTILITIES GRAPHICS — Quick Bosic/C
dine 185 Turbo Poscol/
age Maker 30 ... CALL Desquew 2.0 409 Byline Page Maker 3.0 PF\$ First Publisher 2 Windows 64 Publish It 119 Windows Devel Kit 99 75 75 Auto Sketch Docklink 2

800-662-2686 orders only

Drofix Ultro Design Cod or 3D

Diograph/2000

Draw Applouse EGA Point V2005

Frankring Plus Genenc Cod 3/DP

59 Stataraphics for Ca. Orders, Tech Support, 415-255-2230

205 Disk Technician +

159 Laplink 225 Mirror III 279 Norton Utilities Adv

67 PC Anywhere III. 309 PC Tools Deluxe

270 Who What When

103 Harvard Proj Mngr 3

68

Call for Other Products

Corporate Accounts Welcome . No Credit Card Charge Corporar Roccular Syndomic Pro Celebra Christ Christian Phyl Mehr Viva, MostlerCord. Cashier's Checks. Personal Checks with hold, Qualified P.O.'s CA orders add sales for SOFTMARE Shirthing. — US ground-2% of order, 55 min. US Blue-3% of order, 57 min. PS Blue-3% order, 57 min. PS Blue-3% of order, 57 min

BEST BES1 SERVICE PRICES

584 CASTRO ST., SUITE 487 SAN FRANCISCO, CA 94114

Call for Free Catalog

Feature Packed Turbo 286 \$899!

Try our extremely popular machine for 30 days with-out risk! Has Intel 80266-10 microprocessor switch-



able 10MHz to 6MHz, math coprocessor sup-port, full 640K RAM, hard disk controller, 1.2MByte drive, full size metal case with six 16 bit and two 8 bit expansion slots. Also includes a 200W power supply and high resolution mono graphics adapter, parallel printer output, real-time lithium clock, and "AT" style keyboard. FCC approved. Full year warranty by our own service department. (Shown with optional monitor.)

386 Tower \$1,999



20MHz Intel 80386-20 microprocessor and 1Mbyte of 70ns RAM with 80387 and Weitek support. 1.2MByte drive. floppy/hard drive con-troller a parallel and two er, a parallel and two serial ports, five drive slots. Five 16 bit, one 8 bit, and two 32 bit exnancion slots. Includes 101 key keyboard, hi-res mono adapter. FCC ap-proved. Full year war-ranty, 30 day free triall

\$649 Turbo XT

Our workhorse TENEX Turbo PC/XT in a metal Our workhorse TENEX Turbo PC/XT in a metal "AT" style case, runs at 10MHz/4-X7MHz, full 640K RAM, eight 8 bit slots, and coprocessor support. Includes 380K drive, and "AT" style keyboard. FCC approved. Full year warranty by our own service department. 30 day free trial!

Installation FREE with any system above! Hard & Floppy Drives

360K 5.	25" Floppy Drive		\$79.9
720K 3.	5" Floppy Drive .		\$99.9
1.44Mb	yte 3.5" Floppy D	rive	\$99.9
1.2Mby	te 5.25" Floppy D	rive	\$99.9
Seagate	ST225 20Mbyte	+ WD Controller (XT)\$229.9
Minisca	ibe 8438 30Mbyt	e + WD Contr. (X'	T) \$299.9
Miniscr	ibe 3650 40Mbyt	e 61ms	\$319.9
Miniscr	ibe 3053 43Mbyt	e 25ms	\$439.9
Minisca	ibe 6085 71Mbyt	a 26ms	\$559.9

Sensational Printers

Star NX-1000 \$164.95 • Star NX-2400 \$299.95

Terrific Displays

Magnavox Amber w/ Printer/Grephic Board .. \$159.90 Hi Res Amber Hyundai (Blue Chip) SALE \$79.95

Amazing Modems

1200 Internal Auto Dial/Ans, Software, 2 year . \$49.95 2400 Internal Auto Dial/Ans, Software, 2 year . \$89.95 1200 External Auto Dial/Ans, LED's, 2 year \$79.95 2400 External Auto Dial/Ans, LED's, 2 year \$129.95

Use Visa or MC at no charge; Call for Fair Shipping Charges, Corporate FO's Welcome, De B Listed, Prices and Specifications May Change.

Computer Express Join over 100,000 Satisfied Customers!

Toll Free 1-800-348-2778 FAX (219) 255-1778

CIRCLE 220 ON READER SERVICE CARD

PUTER DISCOUNT WAREHOUSE

data systems

Portable Personal Computer

data systems

Portable Personal Computer



Nobody Sells

ENITH

TENITH data systems For Less

data

LOWEST EVER DISCOUNT



ZCM-1490

PC Magazine
Rerdware Equipment Award of the Year

Zenith Data Systems **New Technology** Flat Screen Monitor that displays like a back lit slide

Zenith Data Systems newly developed ZCM-1490 monitors perfectly flat and nearly reflection free tube creates a video image with colors so vivid and brilliant that it easily outperforms costly professional graphic displays. CDW™ has it at a price comparable with old technology color monitors.

CDW™ Is an authorized TENTEN data systems DEALER

CDW[™] stocks a full line of products to support every computer need

systems **Portable Personal Computers**

SUPERSPORT & SUPERSPORT 286

The new SUPERSPORTS are unquestionably the superior computers on the road today. Equip them with fast hard drives and EMS memory and these machines are as complete a computer as most any you have on your desk

The SUPERSPORT comes standard with two 720 K, 31/2-inch drives, 640 K RAM, 8 MHz clock speed, detachable power pack and total PC/XT compatibility. Add a 20 Meg hard drive and EMS memory, and this machine will surpass any desktop units.

The SUPERSPORT286 Model 20 has everything you need in a computer with many things that you wouldn't expect to find in a portable. 12 MHz processing speed with no wait states, memory up to 20 Meg, a 28 ms 20 Meg hard drive, and a remarkable 600x400 display, the Model 20 will never leave you lacking.

CDWT offers the SUPERSPORT and the SUPERSPORT286 at prices that make these two great machines unsurpassed buys.

TURBOSPORT 386

Now you don't have to leave your 386 on your desk. The TURBOSPORT386 is the com-

puter that satisfies the most demanding computer owner, and allows you to take it with you.

The no-wait-state 80386, operates at 12 MHz, With the standard 2 MByte RAM and the built-in 28-ms, 40-Meg hard drive, the TURBOSPORT386 Model 40 will breeze through your most demanding applications without hesitation. The 640x400 paper white, fluoresent backlit display is the finest found on any portable. The standard 2400 Baud modern makes the Model 40 a complete machine no matter where you take it.

Now, you don't have to settle for less. CDW™ has the lowest prices ever on this hot machine.

Zenith Data System's Z-248/12 and Z-386 offer the very best in desktop computing.

The Z-248/12 is a 286 machine that The Z-386 is the ultimate desktop com operates at 12 MHz, with no wait state With four open 16-bit slots, the Z-248 can grow as your demands grow. Pick from a complete list of optional displays and hard drives, and make this computer one that will stay on your desk for many years.

puter, Its no-wait-state, 16 MHz Intel microprocessor allows the Z-386 to speed through even the most demanding operations. The Z-386 comes with 1 MByte RAM standard and is expand-able in 1 or 4 MByte increments. Add virtually any option and configure the Z-386 to meet your requirements.



CDWTM carries over \$4,000,000,00 in inventory for all your computer needs.

Call CDW™ for custom quotes on Zenith Data Systems entire line of products If you find a better price call us before you buy

WHY WAIT? CALL COMPUTER DISCOUNT WAREHOUSE™ NOW!



FAX (312) 291-1737



Outside Illinois 1-(800) 233-4426

 QUALITY PRODUCTS COMPETITIVE PRICING • PROMPT DELIVERY 24 HOUR ORDER HOTLINE CUSTOMER SERVICE (7AM-5PM PST) -592-8097

415-592-8121

th Y E A

DFI Handy Scanner and 3 Button Mice

for IBM PC/XT/AT FREE DPE Software The HS3000 offers a full 4 rich endow at 400dpi resolution Scan photos, logos, drawings, etc. Can be used with today's most

m. :-

Handy Scanner 200DPI 3-Button Ser Mouse \$49.95 DMS200S 200PDI 3 Button Ser Mouse \$59.95

Pentagon Systems, Inc. Security Access Card for IRM PC/XT/AT and

DMS200

tible Computers The SAC1 is an access control card that prevents unau sorged access to your computer through user passwords. outer through user passwords nst incrusion and corruption at

SAC1 Security Access Cerd.....\$149.95 Intel Connection Coprocessor, Modern.

Above Roard CB6000 Pictured CB6000 only Send-receive FAXes or EMAIL and he all this runs in the background. Easy to-use in software. Includes 256K RAM. CB6000 Connection Coprocessor.... \$799.95 CB6010 Modern Option for CB6000 \$289.95

IR1200 Inboard 386 PC w1MB RAM \$699.95 MB4320 Above Board 286 PLUS..... \$429.95 MB4420 Above Board 28s PLUS multi- \$529.95

Star Multi-Font Dot Matrix Printer 9. no dot mater

tronics parallel in terface • Epson o Print in Courier, lansent, Oresorend 2, condensed Pica, Elife and dai

.....\$199.95

NX1000 Jameco Switch Boxes

Description JE1170 D825 pin A 8 Switch...... \$22.95 JE1171 DB25 pin AB/C Switch....... \$27.95 JE1172 DB25 pin A'B'C-D Switch...... \$29.95 JE1173 Cantronics36 pin AB Switch.... \$24.95 JE1174 Centronics36-pin A.B.C Switch.. \$27.95

Jameco 256K Smart Paraliel Printer Buffer and Parallel/ Serial

Converters PP256 - 256K RAM high speed buffer accepts date from your computer et e very fest

ite and outputs it to your printer while you keep w Female 36 pin Centronics connectors SP100 & PS100 · Serial to Perallel and Perellel to Serial es - Feeture one female DB25 and one male 36 pin

PP256 256K Parellel Printer Buffer \$199.95 SP100 Senal to Perellel Converter...... \$59.95 PS100 Parallel to Senal Converter...... \$59.95

1355 Shoreway Road Beimont, CA 94002 Belmont, CA 94002 24 Hour Order Holline (415) 592-8097 FAX's (415) 592-2503 or (415) 595-2654 Telex 175043 - Ans. Back-V Jameco Bimt Data Sheets - 50c each Send 52:00 Postage for a FREE 1989 CATALOG 1989 Jameco Electronics 4:89

IBM is a registered trademark of

IBM PC/XT/AT Compatible 101-Key Enhanced Keyboard with Calculator With Solar Calculatori

JE2016 (only): · Solar powered calculator offers ease and conven nce of use • 101-key • Enhanced keyboard layoul . Tactile touch keyswitches • 12 function keys • IIluminated LED indicators for Num Lock, Caps Lock and Scroll Lock Separate cursor pad • Low profile

XT or AT

JF 2055



JE2016 Enhanced 101-Key PC/XT/AT Keyboard with Calculator \$79.95 JE1016 Enhanced 101 Key PC/XT/AT Keyboard...... \$69.95

IBM COMPATIBLE DISPLAY MONITORS

AMRER 12" Amber Mono. \$99.95 CTX2410 141BGB 540+200 \$279.95 TM5154 \$399.95 EGA 14" 720x350 JE1059 EGA Montor & Card \$519.95 TM5155 14" Multiscan 800x560 \$499.95 OC1478 14" VGA 720x480 \$449.95 VGA Montor & Card \$649.95

OC1478

JAMECO IBM PC/XT/AT COMPATIBLE CARDS 20/40MB Hard Disk Controller Card (PC/XT).... JE1041 360K/720K/1 2MB/1 44MB Floppy Disk Cont JE1043 IE1044 JE1045 Monochrome Graphics Cardue/Parallel Printer Port (PC/XT/AT)........... \$59.95 Color Granhun Card w/Perallel Printer Port (PC/XT/AT) ... \$49.95 IE1052 JE1055 EGA Card w/256K Video RAM (PC/XT/AT), \$159.95 GC1500 GC1501 I/O Card w Sensi, Game, Printer Port & Real Time Clock (PC/XT).......... \$59.95 JE1060 JE1061 RS232 Senal Half Card (PC/XT)..... \$29.95 JF1065 I/O Card w/Serial, Game and Perallel Printer Port (AT)... \$59.95 JE1071 PMB Expanded or Extended Memory Card (zero K on board) (AT)...... \$119.95

SEAGATE HALF-HEIGHT HARD DISK DRIVES Your One-Stop Center for

ST225 20MB Drive only (PC/XT/AT) \$224.95 ST225XT 20MB w Controller (PC/XT) \$269.95 ST225AT 20MB w/Controller (AT) ST238 30MB Drive only (PC/XT/AT) \$249.95 30MB w/Controller (PC/XT) \$299.95 ST238AT 30MB w/Controller (AT) 40MB Draw poly (PC/YT/AT) \$379 95 ST251 ST251XT 40MB w/Controller (PC/XT) \$419.95 \$489 95 ST251AT 40MB w/Controller (AT) ST251-1 40MB Fast 28ms (Drive only) \$469.95 50MB Drive only (PC:XT/AT) \$449.95 ST277 ST277XT 60MB w/Controller (PC/XT) \$499.95 ST277AT 60MB w/Controller (AT) \$589.95



IBM PC/XT/AT COMPATIBLE MOTHERBOARDS

JE1001 4 27/8MHz (PC/XT) \$89.95 JE1002 4 77/10MHz (PC/XT) \$109.95 JE3005 Baby 8/12MHz (AT) \$329 95 JE3010 Baby 8:16MHz NEAT (AT) \$469.95 JE3020 Baby 16MHz 80386 (AT) \$1100.05 JE3025 Baby 20MHz 80386 (AT) \$1499.95 JF3026 Full Size 25MHz 80386 (AT) \$2299.95



IBM PC/XT/AT COMPATIBLE 3.5"/5.25" DISK DRIVES

352KU 3.5" 720KB (PC/XT/AT) \$100.05 356KU 35' 1 44MB (PC/XT/AT) \$129.95 JE1020 5 25" 360KB (PC/XT/AT) Black \$89.95 JE1021 5 25" 350KB (PC/XT/AT) Beige \$89.95 JE1022 5 25" 1 2MB (PC/XT/AT) Beine egg 05

IBM PC/XT/AT COMPATIBLE MODEMS

1200/300 Baud Pocket-Size Modern (PC/XT/AT)..... 1200H 1200/300 Baud Internal Modern w MaxiMite Comm. Software (PC/XT/AT)..... \$69.95 2400H 2400/1200/300 Baud Internal Modern w Max Mite Comm. Shir (PC/XT/AT) \$129.95 1200C 1200:300 Baud External Modern w MaxiMite Comm Slwr (PC/XT/AT)... \$99.95 2400C 2400:1200:300 Read External Modern wildowldte Comm Star (PC/XT/AT) \$169.95



RIX EGA and VGA Paint Software

Drives

DJ10

TB40

Features • Pop-up menus • Zoom image windows • 9 to 72 point and

34 contemporary tents - Line smoothing - Mouse-keyboard oper-etion - Print capability for almost

any dot matrix, color, or laser print

EGAP EGA Paint Program..... \$79.95 VGAP VGA Paint Program...... \$119.95 - Additional Software Products -SCPLUS Diagnoff Speedcache+ Stwr....\$49.95 Diagnost Extended Memory Stwr \$39.95

EZDOS Digital Research DOS...... \$49.95 EZDOSP WTrueBASIC...... Red Ryder Comm Ster (MAC). \$69.95

30MB Hard Disk Card for IBM PC/XT

\$379.95 SA30.....

Kyocera 3.5" 20 and 30MB Hard Disk for IBM PC/XT/AT

 Includes universal ng hardware and installation kit KC20R 3 5" 20MB Drive Only \$219.95 3 5" 30MB Drive Only..... 40MB Tape Back-Up

for IBM PC/XT/AT 40MB Tape Back Up and Tape... \$349.95 40MB Tape Cartridge...... \$24.95

Computer Accessories JĖ1200

JE1198 Universal Printer St \$9.95 JE1199 Tit Swivel Monitor Base......\$11.95 JE1200 Tit Swivel Mon Base w Pwr Ctr \$39.95 JE1203 Metel Keyboard Drawer....... \$34.95 JE1204 Adjustable Copy Holder...... \$14.95 JE1205 80 Column Printer Stand...... \$13.95 JE1206 132 Column Printer Stand...... \$14.95 JE1207 Adjustable CRT Stand....... \$59.95

Additional IBM Compatible Accessories

JF1010 Flip-Top Standard PC/XT Case...... \$34.95 JE1017 JE1018 JE1032 200 watt Baby AT Power Supply... JE2010

\$80.05 Tower Case w 250 watt Per Supply.... \$299.95 RAM, V20 & Intel Math Coprocessors 262.144x1 (150ns

41256-120 41256-150 (5MHz) V20 Chip (Replaces 8088) \$7,49 UPD70108-8 (8MHzt V20 Chip (Replaces 8088 or 8088 2). 99.49 Math Coprocessor PC XT and Compatibles (8MHz) ... \$139.95 80287-10 Math Coprocessor AT and \$270 OF

\$20.00 Minimum Order - U.S. Funds Only CA Residents Add 6%, 6.5% or 7% Sales Tax Shipping - Add 5% plus \$1.50 Insurance Terms: Prices subject to change without notice.
We are not responsible for typographical errors.
We reserve the right to substitute manufacturers.

Items subject to availability and prior sale Products pictured may only be representative The Following Phone Lines Are Available From 7AM - 5PM P.S.T.: Complete list of terms warrantee is available upon request

Customer Service (415) 592-8121 - Technical Assistance (415) 592-9990 - Credit Department (415) 592-9983 - All Other Inquiries (415) 592-7108

COMPUTER DISCOUNT WAREHOUSE

OVER \$4,000,000,00 INVENTORY IN STOCK



Nobody Sells EPSON' For Lass



LX-800

ALL EPSON MODELS READY TO SELL AT LOWEST EVER DISCOUN

EPSON

Quality computer products that deliver outstanding performance and value at prices only



LQ-500

- 180 cps in draft mode 60 cps (12 CPI) in Near Letter Quality mode Friction and Tractor feed
- Automatic single-sheet loading Two resident Letter-quality fonts "Shadow" and "Outline" print
- Front panel controls

Options Cut-sheet feeder LQ software for Microsoft Windows

WHY BUY FROM

survey of a random sampling of 40,000 customers

early 95% responded that they ould recommend us to a friend

46 said that our product fection was better than average 97% approved of the product knowledge of our salespeople Martin, Publisher of PC Magazine wrote to CDW**

"Thank you for your customer prientation and excellent servic record...! do not know how y do it, but I hope you keep it up.

Because we are so well recommended

MOST ORDERS SHIPPED

COMPUTER DISCOUNT WAREHOUSE™ can offer!



LQ-850

- 264 cps in draft mode 88 cps in Near Letter Quality mode
- 6K buffer
- SmartPark paper handling Front panel controls

 Tractor Feed · Cut-sheet feeder

32K buffer

LQ-950

NEW

- Horizontally prints graphics on 11" wide paper 264 cps in draft mode
 - 88 cps in Near Letter Quality 6K buffer
 - SmartPark paper handling
- Tractor Feed

Cut-sheet feeder 32K buffer

LQ-2550

- 324 cps (Elite 12 CPI)
- in draft mode . 405 cps (Elite 15 CPI) in ultra high-
- speed mode
- 106 cps (Elite 12 CPI) in Near Letter Quality mode
- **RK** buffer . 5 Letter quality fonts
- . Front panel controls with LCD display Single and dual-bin cut-sheet feeders
- · Color enhancement 32K buffer

FX-1050

EPSON



EX-800

- 300 cps (12 CPI) in draft mode 54 cps in Near Letter Quality 8K buffer
- 8 typestyles Front panel controls
 Push tractor feed
- Single sheet loading

Color enhancement 32K buffer

LX-800

- . 180 cps in draft mode
- 30 cps in Near Letter Quality mode 8K buffer
- 80 column
- Automatic single-sheet loading
- Front panel controls IBM ProPrinter character set

w/envelope feed capability Serial Interface Friction and tractor feed AUTHORIZED

EPSON® DEALER

If you find a better price call us before you buy.

WITHIN 48 HOURS.

Call CDW for custom quotes on our entire line of products.

FX-850

Cut sheet feeder

 8K buffer 136 column (FX-1050)
 Friction and tractor feed

264 cps in draft Elite mode 54 cps in Near Letter Quality

Automatic single-sheet loading
 Front panel controls

WHY WAIT? CALL COMPUTER DISCOUNT WAREHOUSE™ NOW! Nationwide Toll Free

CDW™ stocks a full line of products to support every

CIRCLE 109 ON READER SERVICE CARD (312) 498-1426 (312) 291-1737



Hard Disk

Complete Kit w/Controller \$148

1200 Baud w/Software Modem

Jade 10 MHz Turbo XT1398		Terminals	Intel
	Monitors		8087
640K Motherboard w/256K RAM	Amdek 310A amber	WYSE model 30	
Floppy Disk Controller	Amdek 410A amber	WYSE model 501368	8087-2 \$138 80387-SX \$348
140 Watt Power Supply	14" amber flat screen\$128	WYSE model 85	8087-1 \$178 80387-18 \$378
101 Enhanced Keyboard	RGB 640 X 240 color		80287*8 148 30387-20 1398
	EGA 640 x 350 color	Jovstick	80287-8\$218 80387-25\$528
Monochrome Graphics System 1698	VGA 800 x 560	Kraft 3 button Joystick	Above board PC 64K
640K RAM, 360K Disk Drive	NEC MultiSync IICall		Above board 286 Plus 512K 1418
Printer Port, Amdek 310A Monitor	NEC MultiSync II 2A	Dual Game Port19	In board 386 \$1028
30 MB Hard Disk System add 1298			504.5 505
CGA Color System add \$188	Mutsubishi Diamond Scan 498	Plotter	Cables
EGA Color Systemadd 1398	Zenith 1490 flat screen	Roland DXY 885	6' printer
VGA Color Systemadd 1568	Sony 800 x 600 Multi Scan \$488	Houston IntrumentsCall	10' printer
VGA Color Systemaud 300	Keyboards	Hewlett Packard all models Call	25' printer
Jade 12 MHz Turbo 286\$898			
	84 Key AT-style	Scanner	9' serial\$18
1 MB Motherboard w/512K RAM	101 Key enhanced	Complete Hand Scanner 1148	25' serial
200 Watt Power Supply	Printers	Complete 4" Scanner	50' serial
Clock/Calendar	EPSON LX-800 9 PIN	Logitech Scan Man	100' serial
Enhanced 101 Keyboard	EPSON FX-850 Call		Keyboard extender
	EPSON FX-850Call	Diamond Flower 3000 198	Monitor extender
Mono Graphics System 11098		Hewlett Packard ScanJet Call	Printer extender
1.2 MB Floppy Drive & Controller	EPSON EX-800 Call	Digitizers	rimier extender10
Printer Port, Amdek 310A Monitor	EPSON DFX-5000 Call	Summa Sketch 12 x 12	
40 MB Hard Disk System add 1438	EPSON LO REBATE		Boards
12 MHz. 1 MB of RAM add *148	THROUGH 4-30-89	Mouse	Monographics w/Parallel 148
TE MITTE, T MIC OTT I MITTE THE CO. 140	EPSON LQ-500 24 PIN 125 Rebate		Color Graphics w/Parallel 348
Jade 20 MHz Turbo 386 \$1998	EPSON LQ-850 150 Rebate	Opto-mechanical \$90	EGA card158
1 MB of RAM on Motherboard	EPSON LQ-950*75 Rebate	with Software 329	VGA card1268
1:1 Interleave FDD/HD Controller	EPSON LO-93075 Nebate		Dual game port
2 Serial, 1 Parallel, Clock, Calendar	EPSON LQ-1050\$100 Rebate	LogiTech	XT I/0 Par/Ser/Clk/Game 158
	Okidata 320	LogiMouse Serial	AT I/0 Par/Ser/Game158
101 Enhanced Keyboard	Okidata 321	LogiMouse Bus	360/720K 1.2/1.44 MB FDC 48
	Okidata 390	LogiMouse Hi-rez188	AT FDD/HD controller\$128
40 MB Mono Graphics System 2388			
1.2 MB Floppy Disk Drive	Okidata 391	Mouse Systems	XT Hard Disk controller
40 MB Hard Disk Drive	Okidata 393	PC Mouse with Paint	AST Six Pak Plus
Amdek 310A Monitor	Panasonic KX-P1180		AST XFormer578
		Microsoft	Paradise auto EGA 350 168
Disk Drives	Panasonic KX-P1191 239	Mouse w/Paintbrush	Paradise VGA+
360K half height	Panasonic KX-P1124 1318	Mouse w/CADCall	Paradise VGA+ 16
360K full height	Panasonic KX-P1592\$388		
TEAC 55 BV	Panasonic KX-P1092i	Mouse w/WindowCall	
1.2 MB for AT	Panasonic KX-P1595		Surge Protector
	Panasonic KX-P1524	Complete PC	S. L. Waber 6 outlet
3½" 720K	Panasonic KX-P4450 1548		Isobar 4 outlet
3%" 1.44 MB	Tunasomo (OTT - 1000 TTTTTTT TO 1000	Complete FAX 4800	Isobar 8 outlet
51/4" ext. 360K for PS/2 1218		Complete FAX 9600	Isobar modem protector\$24
5\" ext. 1.2 MB for PS/21258	Dalsywheel Printer	Complete Answering Machine 1248	isobar modern protector24
5\" ext. for LapTop	*****		
A SELVER S	40 CPS Parallel and serial\$199	Switch Boxes	Tripplite Battery Back-up
Hard Disk Drives	L	Parallel or Serial (Specify)	450 Watt UPS
10 MB w/controller1148	Hewlett Packard DeskJet		750 Watt UPS
20 MB w/controller\$228	DeskJet	2 way AB ¹ 28	1200 Watt UPS
30 MB w/controller\$268	128K PDP Desk RAM	3 way ABC538	1200 Wall Of S
40 MB w/controller		4 way ABCD58	Tripplite Line Stabilizer
40 MB for AT *338	EPSON emulation cartridge *68	5 way ABCDE	600 Watt LC98
ST 125 20 MB	TMS RM/HELV Soft Font	Crossover X	
ST 138 30 MB	Ink cartridge ¹ 19	AutoSwitch 3 way198	1200 Watt LC \$158
ST 251 40 MB	Hewlett Packard LaserJet	AutoSwitch 6 way1248	1800 Watt LC1188
	LaserJet II		
ST 251-1 40 MB\$448			Accessories
ST 4096 80 MB1568	LaserJet IID Call	Modems	
Total Back on	25 in One Font Cartridge 1398	1200 internal w/software \$48	Kensington Master Piece 188
Tape Back-up	4 MB card w/0 memory	2400 internal w/software 198	Master Control Center \$48
CMS Jumbo 40 MB XT/AT 1298	1 MB memory card	1200 external	MicroSpeed PC-Trac Ball 178
XT/AT Kit External\$128	2 MB memory card	2400 external	Vertical CPU stand
PS/2 Internal Kit58	4 MB memory card 31148	2400 PS/2 internal	Keyboard drawer
PS/2 External Kit	Toner cartridge98	Intel 2400B for PS/2	Monitor Tilt-n-Swivel
	Toller Carrioge90		
4901 W Rosecrans Ave Box 504	· ·		

4901 W. Rosecrans Ave. Box 5046 Hawthorne, California 90251-5046



Texas

California Torrance, Santa Ana, Woodland Hills Kearny Mesa, Sunnyvale

ADE COMPUTER

Place orders and use our technical support toll free!

Continental U.S.A. 1-800-421-5500 Inside California 1-800-262-1710

Addison, Houston CIRCLE 243 ON READER SERVICE CARD Fax machine 1-213-875-2522/Ali others 1-213-973-7707 Arizona Georgia

Smyrna Phoenix Not all items in stock at our nine retail locations



We accept checks, credit card or purchase orders from qualified firms and institutions. No surcharge on credit card orders. CA., TX. GA. & AZ. residents add sales tax. Prices and availability subject to change without notice. Shipping and handling charges via UPS ground 50¢/lb. UPS air \$1.00/lb. Minimum charge 14.00.



—PIICEON— COMPAQ MEMORY MODULES

FUN DESKPHU 3	۰	ю	"	a	١,	Z	•	•	3	œ	•		
4 MB Memory Modules													170
1 MB Memory Modules													55
4 MB System Memory E	k	æ	u	d	١.								175

4 Mid System Memory Board	1750
-AST-	
Premium/286-MDL80	133
Premium/286-MDL90	1999
Premium/286-MDL120	2329
Premium/286-MDL140X	2268
Premium/286-MDL170	3064
Premium/286-MDL340	3972
Rampage 286 0K	284
Rampage 286 512K	399
Rampage/2-286 0K	284
Demonson 1000 F10V	

COMPUTER OASIS (813) 289-6598 Complete Systems Available • Quantity Pricing Available P.O. BOX 23666 • TAMPA, FLORIDA 33623 MONDAY-FRIDAY 9:00 A.M.-8:00 P.M. EST.

PRINTERS

			-	•	-	•	E	۰	•				
180D													
MSP-15	Ε.												339
MSP-25													399
MSP-40													289
MSP-45													429
MSP-50													339

390	١.																						46
391																							63
									_	1	V	E	c	٠,	_								
220	0																						\$34
520	0																						51
530	0																						69
LC-	8	31	0	ι	a	s	0	n	*	ri	te	н										3	201
LC-	8	Э	0	L	a	s	0	n	۰	ri	te	×										4	327
Pov	re	n	m	a	te	9	3	8	6	2	0	•	w	4	2	1	W	8	1	4	D	:	362
Pro		ú			4	2	٥	c		×		١.	10										224

(800) 537-4331 FAX: (813) 289-989

40 MB W/CONDONEY 476
—TAPE BACK UPS—
20 MB for AT/XT
20 MB for PS/2
-INTEL-
8087-2 MATH CO-PRO
8087-10 MATH CO-PRO 230
80387-20 MATH CO-PRO 495
ABOVEBOARD 286/512K
ABOVEBOARD 286-PS/512K 395
-SOFTWARE-
Wordstar Professional 3.31 \$247

ABOVEBOARD 286/512K 380	
ABOVEBOARD 286-PS/512K 395	
-SOFTWARE-	
Wordstar Professional 3.31 \$247	
Lotus Symphony 445	
Microsoft Word 5.0 230	
Microsoft Excel for Mac 1,5 259	
Multiplan 4.0 129	
Aldus Pagemaker 499	
Adobe Illustrator Window 395	
Xerox Ventura Publisher 519	
Lotus 123	
Auto Cad Ver. 1.0 1967	

DESKTOP PUBLISHING

1 MB Memory for HP Laser Jet II				\$339
2 MB Memory for HP Laser Jet II				669
25 in 1 Font for HP Laser Jet				
Microsoft Mouse Serial/Bus				105

WE ACCEPT CORP PO'S. 3% ON VISA, MC, AM EX. 15 DAY DOA RETURN/ EXCHANGE POLICY. FULL MFG WARRANTY.



CIRCLE 178 ON READER SERVICE CARD

Testing. Testing.







One

Two

Three

The Graduate Management Admission Council sponsors a series of publications to prepare you for an MBA program.

The Official Guide for GMAT Review. This is the number one review for the Graduate Management Admission Test. It's prepared by the people who develop and administer the test—ETS. And it's the only review that gives you 580 actual—not simulated—test questions.

The Official Guide to MBA Programs. Here are the key facts on more than 500 B-schools. Read this before you send out all those application fees. The Official Software for GMAT Review. This specially designed software program is totally self-contained. There's no need to flip to a book. Run sample tests and see your score immediately. Find out why your answers are right or wrong. Software is available for the IBM PC, PS/2 and compatibles. Pick up the books at your bookstore or order by mail. The software is only

available by mail. For ordering information call (609) 771-7243.

CIRCLE 229 ON READER SERVICE CARD

GMAC* Graduate Management Admission Council

Haven't You Heard the News?

You don't have to buy the whole newsstand to get copies of your latest article or review. Order customized reprints from Ziff-Davis Publishing Co

To find out how you can have your article or review reprinted, contact Jennifer Locke— Reprints Manager; Ziff Davis Publishing Compuny, One Park Ave., New York, NY 10016, 212-503-5447.

*Manager assesses 500 month



PRODUCT CATEGORIES

DATA

HARDWARE	
ADD-ON-BOARDS373	DISKETTES377
CD-ROM373	EXPANSION UNITS
CABLES373	PERIPHERALS 378
COMMUNICATIONS 373	PLOTTERS378
374, 375	POWER
COMPUTER	SUPPLIES
SYSTEMS376	PRINTERS379
DISK DRIVES377	SECURITY379
SOFTWARE	
ACCOUNTING379	MANUFACTURING 384
BUSINESS379	MEDICAL
BUSINESS PROJECT MANAGEMENT 393	MUSIC385
BUSINESS TIME MANAGEMENT379	PREVENTATIVE MAINTENANCE385
COMMUNICATIONS 379	
CONSTRUCTION380	PROGRAMMERS TOOLS385, 386
DATA BASE 380	PUBLIC
DATA ENTRY 380	DOMAIN 386, 387
DESKTOP PUBLISHING380	REAL ESTATE387
EDUCATION380, 381	RELIGION387
ENGINEERING381	SALES
ENTERTAINMENT/	MARKETING388
GAMES 381, 382	SCIENTIFIC388
FINANCIAL 382, 383	SECURITY388, 389
FLOWCHARTING 383	STATISTICS389
GRAPHICS 383	SURVEYS389
HEALTH384	TAXES
INVENTORY384	UTILITIES390, 391
MAILING PROGRAMS 384	WORD PROCESSING 391

MISCELLANEOUS									
ACCESSORIES 391	DATA RECOVERY SERVICES								
BAR									
CODING 392, 393	DISK								

CONVERSION394 BOOKS/CATALOGUES/ PUBLICATIONS ... 393 DISKETTE COPY SERVICE.....394, 395 BUSINESS PROJECT MANAGEMENT 393 NETWORKING.....395 COMPUTER INSURANCE.....393 SUPPLIES 395

TRAINING/

TUTORIALS 395

394

RATES AND INFORMATION

CONVERSION 393

PC Magazine Marketplace is a special economical section for product and service listings.

Listings are grouped by category and sold by column inches. Second color option available.

Standard Directory Listings are also available for a minimum of 4 issues at \$575 per issue (\$2300 total). For additional information call 212-503-5115.

MARKETPLACE ADVERTISING STAFF

PC Magazine, 3rd floor One Park Avenue, New York, NY 10016

Group Sales Director Kathryn J. Cumberlander Group Sales Manager Daniel L. Rosensweig Support Manager Monica B. Dixon

Sr. Advertising Coordinator Linda Annis-Lopez Advertising Coordinator Wanda D. Brown Production Director Anne Brockinton Production Coordinator Robert Clark .

ACCOUNT MANAGERS

Glenda Campbell (212) 503-5118 NY, GA, PA, VA, DC, OH, AK, WY, MA Michael Brooks (212) 503-5125 Jeanne De Simone (212) 503-5156 TX. MN. WI. AR. NC. IN. RI. DE. SC. LA. ID, MT, OVERSEAS Kathleen Morris (212) 503-5176 UT, TN, NB, HL (CA 94000 & UP)

Kenneth Nova (212) 503-5175 WV. FL. VT. NH. (CA 93996 DOWN) MI, CT, IL, KY, ME, OR, OK, AL, MO, NM, IA

Jonathan Adewumi (212) 503-5117 NJ. WA. MD. AZ. CO. NV. MS. KS. ND. SD (ALL CANADA)

1-(800) 825-4ADS



HARDWARE/ADD-ON-BOARDS

ust minutes away!!!! WARPSPEED/386 CONVERSION SET INCLUDES:

80386/20MHZ Motherboard AMI BIOS Installed 1 Mb 80ns DRAM Installed

* Battery * Installation Guide * LANDMARK Setup Software Complete Price: \$1495

\$1595 80386/24MHz with 1Mb DRAM 80286/20MHz with 512K RAM \$995 MC/Visa Accepted-3% Shipping Handling

ORDER LINE: (800) 627-6998 Home Smart Computing



for your PC, XT, AT or Competit

- **♦VOICE MAIL SYSTEM**
- ◆TELEMARKETING

 -Inbound & Outbound
- **SMARTEST ANSWER** MACHINE
- ◆AUTODIAL-DATABASE ♦ VOICEPAD"

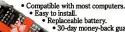
 - Voice for your Programs
- **◆PROGRAMMER'S** TOOLKIT (optional '79*)

1/2 card, software, cables, & speaker \$26900 + 5 s/h

> (415) 652-9600 Talking Technology, Inc. 4383 Piedmont Ave. Suite B Oakland, CA 94611

LE 552 ON READER SERVICE CA

Never enter time and date again. dClock II \$49.95 Slotless Clock-Calendar



 30-day money-back guarantee.
 Great gift idea. To Order (817) 540-0938

Or write to Microsync MICRO 2107 West Euless Blvd. Euless. Texas 76040 Please add \$2.50 for shipping & handling CIRCLE 554 ON READER SERVICE CARD

CABLES



PUT YOUR PRINTER UP TO 300' AWAY! NEW LONG RANGER™ PRINTER

EXTENDER AND BUFFER

- plugs, up to 300' (10' cable included) Optional 32K (15 pg.) or 64K (30 pg.) buffer
- No power supply needed
 Works with PCXTATIPS2 parallel
 Guaranteed compatible with all software
 1-year warranty; 30-day, money-back gua LONG RANGER EXTENDER

RANGER

RANGER TECHNOLOGIES, INC. 2235 FIRST ST. #119 SIMI VALLEY CA 93069 (805) 5B3-8B47

CIRCLE SEE ON BEADER SERVICE CARD

OINA9M on allows you to Companion add an extra keyboard and

monitor up to 600' from your PC system unit. Now available for VGA and PS/2. DEALER PROGRAM AVAILABLE PRICES START AT \$219.00

CYBEX CORPORATION 2800 H. Bob Wallace Ave. Huntsville, Al. 35805 (205) 534-0011 RCLE 557 ON READER SERVICE CAP COMMUNICATIONS

PC-Hooker

Connect any two IBM compatibles and transfer files back and forth at speeds exceeding 115,000 baud, faster with parallel.

Faster than LapLink Easier than Bridge

- Universal serial cable. parallel optional
- Bi-directional transfers
- Disk/file management, eg, Dirtree, Sort, Find, View
- Text edit and print facility
- Chat mode 5 %" and 3 %" disks
- PS/2 ready

PC-Hooker includes everything you need for fast and easy file transfers for only \$79.95 PC-Hooker PLUS with Haves modem support is \$99.95. Do everything in the background with PC-Hooker TSR for \$129.95. For a limited time, get a parallel cable FREE with PLUS

and TSR. AMICA 1-800-888-8455 CIRCLE 558 ON READER SERVICE CARD

COMPFAX, INC.

CHIPS-ALL SPEEDS

Processors-Intel SHARP 220... SHARP 420... BROTHER 150.....\$889

'We Are The Cheapest' 1-800-243-7775

in IL. 312-394-3334 CIRCLE SSO ON BEADER SERVICE CARD

TO PLACE YOUR

AD IN

PC Magazine

Marketplace

Call (212) 503-5115 or (800) 825-4ADS



THE X-BANDIT 4 EMS 4

For XT/AT. Enhanced, expanded memory utilizing LIM 4 0 specifications. Segmented memory mapping, split memory addressing, 2 mb in one slol. 8 mb total. Spooler, RAM disk auto configuration software, manual, warranty all included \$229 TELETEK ENTERPRISES INC

4600 Pell Drive Sacramento, CA 95838

(916) 920-4600 (916) 927-7684 FAX

CD-ROM

Hitacht External Drive
Tookbin Drive for MAC SE/Plus/E
WORM Drive Special - Master 800 MB
Portable 286 w/CD ROM Drive
we'Title Combos:
PC Stater Set (2 titles + Drive)
Microsoft Programmer's Library + Drive
Comsuck Photography + Drive

Consumer Statistics or Economic Statistics ClubMac or Educorp (MAC) PC Sig or Pravida Ziff-Davis Computer Library (NEW) Oxford English Dictionary

of CD-ROM titles. Free 100-page AMEX/MC/VINA rau of Electronic Publishing sushing Square, Verona, NJ 07044 (20) 7746-3031

CD-ROM



CD-ROM/WORM OUTLET IS YOUR DATA SAFE? SAVE WITH THIS FANTASTIC OFFER

HITACHI & TOSHIBA DISCOUNTED

BOOKSHELF & CD-ROM DRIVE \$725.00 THE BIBLE LIBRARY 9 Bibles, 20 References

Discounted GROLIERS, McGRAW-HILL SCIENCE, SUPERMAP, PC-SIG. US ATLAS GEOVISION AND MANY MORE!

FOR \$960 CALL ANYTIME 1-800-543-1734 ORDERS ONLY

JASON ENTERPRISE

9



218 Pine St. Buffalo, N.Y. 14204 CIRCLE 553 ON READER SERVICE CARD

PC MAGAZINE ■ APRIL 11, 1989

COMMUNICATIONS



Includes all hardware and software-Nothing

- NET/30 Network Operating System is full-featured. has extensive on-line help, and saves memory File sharing, print spooling, file/record locking, electronic mail, menu system, security, network management. diskless workstations, diagnostics
- Also compatible with NETBIOS, IBM PC LAN rogram, Novell Netware
- 30-day money-back guarantee and one-year warranty.

Model 200 Model 300 Model 200 A Ethernet Compatibility IBM PC/XT/AT IBM PC/XT/AT Micro Channel IBM PC/XT/AT 8 Bit 8 bil 8 or 16 Brt 16 Rit Speed 1.8 Mbps 3.0 Mbps 1.8 Mbps 10.0 Mbps Twisted pair Twisted pair Twisted pair Wiring Thin coavial

\$215.00 \$315.00 \$399.00 Price For more information call (415) 578-5967 or write.

\$399.00 "A joy to use. I highly

rork is a darn



Extend the distance between Extender

by cybex

Monitor/Keyboard and System Unit up to 600 ft. IBM PC, XT, AT, PS/2 and 100% compatibles Available for MDA, CGA, EGA (TTL) and VGA (Analog) Monitors

25, 50, 100, 150, 200, 250 ft. lenghts Special orders for any length up to 600 ft. Prices start at \$150 One-of-a-kind product

CYBEX CORPORATION 2800 H. Bob Wallace Avenue (205) 534-0011

CIRCLE 560 ON REAGER SERVICE CARG

NOBODY DOES

SHARP MURATA RICOH

XFROX

BETTER

Factory Warranty

Full Training Immediate Delivery Installation Low Discount Prices CALL NOW

FAX OF AMERICA

1-800-342-3299 IND. Call 219-256-7019

America's Low Price **FAX Distributor**

CIRCLE 561 ON READER SE

ADD A SECOND USER to your XT/AT/386

- · Two users can work simultaneously under DOS on same or different programs.
- Use any off-the-shelf DOS program. SHARE file, data, modern
- math co-processor, printer and other peripherals



INSTANT SATELLITE NETWORKS

Distributing information via satellite is profitable and cost effective. You can deliver information anywhere in the continental U.S. in seconds to an unlimited number of locations. You control authorization to receive your transmission, S.T.A.R. provides you with everything you need. 5.T.A.R. will help you get started. Call us today at (801) 225-7000

Satellite Technology And Research 530 SOUTH COMMERCE ROAD, OREM, UTAH 84058 FAX (801) 225-1660

CIRCLE 563 ON READER SERVICE CARD

EDITOR'S CHOICE



THE FACT FILE

Get The Word Out! Your Product Has Been Chosen EDITOR'S CHOICE.

Let us take your article to its highest level of marketing potential with a reprint!

To find out how you can have your article or review elegantly reprinted ** on 80 lb. paper stock, in 4-color, 2-color or 1-color, call or write today:

Jennifer Locke-Reprints Manager; Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016, 212-503-5442.

**Minimum quantity 500 reprints



TOSHIBA FAX \$385

COMPUTERS, PRINTERS, Low Low \$\$

TOSHIBA LAPTOPS

T-1000 \$779
T-1200 F 2 FLOPPY\$1299
T-1200 FB \$1499
T-1200 H 20 MB hrd \$2189
T-1200 HB 20 MB hrd \$2295
T-1600-286 + 20MB \$3099
T-3100E-286 + 20MB\$2695
T-3200-286-40MB \$3495
T-5100-386-40MB \$4495
T-5200/40MBCALL
T-5200/100MBCALL
ZENITH LAPTOPS

.\$1495
.\$2295
.53099
.\$3495
.\$4995 .\$5329
RS

LX	-800			٠												-	1	9
LC	-500	١.		٠	٠	٠	٠		٠	٠	٠			٠	٠		3	3
LG	-850	٠.														4	5	4
LC	-105	0														C	A	Ц
LC	-255	0														5	9	4
FΧ	-850															Б	3	9
FX	-105	0														4	5	2
EX	-800	i.						i					i	i		K	4	4
DF	X-50	100	ĺ					i								\$1	13	4
	AN																	
KY	P-10	R	ı													5	31	7

KXP-1091I \$19

NAP.																		
KXP	159	2.															53	ы
KXP																		
T	O:	Sŀ	П	I	3	A	١	ı	Э	F	1	T	7	ī	ī	ľ	ıs	
P32	1SL	Ξ.	ı	ı	ı						Ī	ï	ï	ì	Ī	ï	\$4	8
500		~																м

P321SL								\$4
P321 SLC								\$5
P321SL								\$5
P351 SX .								\$8

FAX PAPER

TYPE	MODELS		P	i	IC
98P6	96' Rolls, 6/CTN .	Ī			\$2
	164' Rolls, 6/CTN				
328P6	328' Rolls, 6/CTN				\$6

COPIERS

SAN SAN	Y	٥	ŧ	3	Ė	T	6	O	6							\$5	ŀ
Z50 Z55 Z70								٠			٠					\$6	ú
PC-7 PC-6	,			Ī			ì	ı					i		9	11	7

H P PRINTERS

	_		Ė		=		-		-	
LASER JET										
DESK JET .										
PANSONIC	4	ı)()						\$1450

XEROX 455 REMFG \$385
NISSIE 303 \$595
HARRIS 3M REMFG \$575
MURATA 1200 \$645
MURATA 1600 \$745
RICOH RF800 \$755
RICOH FAX 10 \$1165
RICOH FAX 20 \$1395
RICOH FAX 35 \$1655
RICOH FAX 60 \$1695
RICOH FAX 70 \$2285
CANON FAX 8 \$745
CANON FAX 20 \$1045
CANON FAX 25 \$1575
PANAFAX UF155 \$955
PANAFAX UF150 \$995
PANAFAX UF 250 \$1395
PANAFAX UF 260 \$1595
PANASONIC KXF 120 \$995
SANYO SF100 \$875
SANYO SF 200 \$1045
SANYO SF 515 H \$1370
SANYO SF 725 \$2495
SHARP FO 220 \$865
SHARP FO 300 \$1095
SHARP FO 420 \$1175
SHARP UX 180 \$865

SHARP UX 350 \$1175 TOSHIBA TF 211 ... \$1375

Terms: These are Prepay Prices, C.O.D. + 2%, VISA/MC + 2%, Restocking 20%. Accept Cashiers Check.

-800-383-3199

T.P.C. 12603 Hoover St. • Garden Grove, CA 92641 • FAX 891-1202

COMPUTER SYSTEMS

BEST DEAL IN U.S.A.! LOGITECH PS BUS MOUSE 3 button, generic bus card, & software drivers, FREE CAD program! \$35! 10+ \$30!

12" VGA MONITOR \$349! Quality of AMDEK VGA at a fabulous EGA price.. Limited

FUJITSU ESDI 73MEG \$395! Model 2244E, 25MS access time!! Twice the data transfer as MFM drives! Great for LAN, CAD, 386! What a Deat! ESDI HD/FLOPPY Controller \$179

MONO 386 SYSTEM, 73MEG Unitron 388, 16MHZ, 1meg RAM, Am-ber monitor, enhanced KB, 73MEG, ESDI hard drive ONLY \$1895!

TRACKBALL/KEYBD COMBO Trackbell/KEYB Combo Unit, FREE Dr. Halo software (850 VALUE) \$ 119.00 (800)452-4445ext1132 In CÁ Call (800)626-9541ex11132 SYSTEM MASTERS-VISA/MC/COD CIRCLE SAS ON READER SERVICE CARD



- Phoenix BIOS
 12 or 16 MHz, 0 wait states
 Expandable to 1 megabyte
 On board clock and calendar
- Digital speed display
 Hardware reset & turbo sw.
 5-Dr. capacity with 3-Dr. open
- 200 watt power supply

12 MHz 16 MHz Bare Bone 490.00 645.00

- Zero K RAM

 1.2M floppy drive
 Floppy/HD ctrir
 101-key keyboard
 - 770.00 925.00

Order (800) 543-5107 [Info (714) 990-2097 JAWIN COMPUTER PRODUCTS

We stock over 100 items of peripheral cards, please write for our price list.

IBM PS/2's

AVOID THE HASSLE & THE RISK! Call 1-800-GO TO PRC

GREAT PRICES

For example: 10 MHz AT 640K VGA System \$1425

Highest Quality Components Knowledgeable & Courteous Personnel Full Line Computers & Peripherals in Stock

Get it all at: PRC Technology Inc.

IN CALIFORNIA, CALL: 1-818-350-8810 CIRCLE 566 ON READER SERVICE CARD THE GIANT SLAVERS

80MB, 25mS Hard Drive! 5 9 10387-24MHz & 80287 Sockets Super Case with 200W Power Supply Enhanced - 101 Keyboard One Yr warranty Parts & Labor Options: 40MB to 36MB (Novell), 387, V 5

ESC386-20MHz-80MB \$2195! ESC Computers, Inc.

(213) 655-3605 Fax (213) 655-8945

CIRCLE 567 ON READER SERVICE CARE

Up to 41% off!

3.595 \$2.350 MODEL 50-021 MODEL 60-041 MODEL 60-071 5,795 MODEL 80-041 6,995 4 785 MODEL 80-071 7 005 MODEL 80-111 8.995 MODEL 80-311 11.995 8.395

nerican Micro Computer Center 2890 Griffin Road - Suite #4 Ft. Lauderdale, Ft. 33312 (305) 985-9406 CLE 569 ON READER SERVICE CARD

Computer Systems/Disk Drives

8088 sv5 640K 20MR CGA \$1066 286 5v5 640K 40MB FGA \$1709 \$3295

1MB 80MB HD VGA TIGERBDARD 286 upgrade XT SEAGATE ST251 40M8 HD \$205 \$333 SONY 3 5° F Drive 720K SDNY 3 5° F Orive 1 4MB \$84 \$99 FUJITSU 5 25" F Drive 360K FUJITSU 5 25" F. Drive 1 2MB \$67 579 DRCHID Pro Design. 512K VGA NANAD 16" Flexscan 9070S \$425 \$1075

DMC 1234 South St., Long Beach, CA. 90805 Tel: (213) 422-4444 Fax: (213) 422-7676

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .



LAPTOP SPECIALS ZENITH . TOSHIBA . NEC

- SHARP - DATAVILE

The Latest Laptops at Low Prices along with a wide Selection of Accessories Including . . .

- . 51/4" or 31/2" Ext. and int. Drive Units For Laglops and Desktops New Tandy 1400 LT and Toshiba
- 1100 + Internal Hard Drive Upgrades 1200 and 2400 Baud Modems. Diconix Printers and Numeric Key-

pads For Laploos Panafax and Sharp Fax Machines For Fast Reliable Service Call

COMPUTER OPTIONS UNLIMITEO 201-469-7678 • 7 Days 9AM-10PM (EST)

CIRCLE 572 ON READER SERVICE CARD



22511 Kuty Fwy Katy (Houston) TX 77450 1-713-392-0747 FAX 17131 574-4567 800-231-369 indunium marka arabinaran

MONTHLY SPECIAL

\$1713 386/25MHz

CALL TODAYI 1-800-999-2807

Complete System with IMB-DWS, MOMO, 1.2MB FO, 287/387 socket 100% Compatible, No Tricks, No Hidden costi

1:1 ND, EGA, VGA, 286/12, 286/16, 386/20 COMPATIBLE WITH OS/2 AND ALL MAJOR METWORKS. FULL TECH. SUPPORT & CUSTOMER SERVICE.

CAPITAL COMPUTERS INC. SINCE 1980

LAND THE BIG ONE!



E xpect more than a few nibbles this season from clients and distributors. Ziff-Davis reprints are custom-designed and will make your product's review an attractive marketing lure.

If you're looking to land the big one this season, contact Jennifer Locke-Reprints Manager, Ziff-Davis Publishing Co., One Park Ave., NY, NY 10016, (212) 20 503-5447, or on MCI Mail. (Min. order 500 reprints.)

FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

DISK DRIVES

SPECIAL REPAIR COUPON

10	CUA	L NER
Capacity	Flat Rate	SPECIAL
10-19mb 20-30mb	\$99	\$89.10
20-30mb	\$125	\$112.50
31-40mb 41-49mb	\$150	\$135.00
	\$175	\$157.50
50-85mb	\$210	\$189.00
86-120mb 121-150mb	\$275	\$247.50
121-150mb	\$325	\$292.50
Test & Eval.	\$25	

VALID THROUGH 5/15/89 We repair most major brands FLOPPY DRIVE REPAIRS FLAT BATE

ONLY \$45 90 day warranty on all repairs. 5 day turn-around time Ib TECHNOLOGIES, INC. 21011 Itasca St. #F Chatsworth, CA 91311 Telephone (818) 709-6400 CIRCLE 575 ON READER SERVICE CARD

DISKETTES

Why waste your time formatting disks?

Preformatted disks save you time and money!

Memorex • Nashua • 3M

51/4" (from 48c) • 51/4" HD • 31/2" • 31/2" HC Call toll-free TODAY!

1-800-321-4668 In Colorado (303) 423-0371. Open 8:00 to 5:30

Mountain Time, Monday-Friday.

SEE US AT COMDEX BOOTH 7361

ALF Products, 3940 Youngfield St., Wheat Ridge, Co. 80033

CIRCLE 576 ON READER SERVICE CAR

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct-Response/Display Ad format represents a fast, easy and cost effective method of product acquisitis They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery ness can benefit from the 700,000 brand specifiers who read PC Magazi

So take DIRECT action and call (212) 503-5115 or (800) 825-4ABS

DISKETTES

BUY QUALITY FOR LESS! BULK DISKS & TAPES

100% CERTIFIED LIFETIME WARRANTY

DYSAN

51/4" DS/DD 59° 51/4" DS/DD 39° 31/2" DS/DD 1.09 51/4" DS/HD 89¢ Bulk disks: Min. qty 300 With Tyvek sleeves & label kits

QD2000 QD300XLP 17.84 OD600A 19.53

In NJ 201-462-7628 800-222-0490 FAX: 201-462-5658

P.O. Box 710. Freehold, NJ 07728

EXPANSION UNITS

Name Brands * Low \$\$

ERIPANSION BOARDS
ART Singespine (84-384)
ART Singespine (84-384)
ART Singespine (84-384)
Advanting (786
Advant

VLM Computer Electronics 10 Park Pisce, Morristown, NJ 07960 (201) 267-3268*Visa,MC,Check or COD

DYNAMIC RAMS

SIMM 80100 1MBIT 10016 51425610016 \$24.00 \$27.00 41464 150ns 41256 120ns \$ 9.95 \$ 9.25 \$ 8.85

4164 ### CONTROL | CO

I.C. EXPRESS



CIRCLE 580 ON READER SERVICE CARD



EXPANSION UNITS

ICs PROMPT DELIVERY!!!

	OUTSIDE ONLAH	MA: NO SA	LES TAX	
		MIC RAM		
	SIMM 19256Kx2	s 80 ns	\$650.00	
200		9 80 ns	370.00	
•	SIMM! 256K	1 60 ns	150.00	200
20	1Mbit 1Ms	1 80 ns	34.50	~
	1Mbit 1Ma	1 100 ns		
	41256 256Ks	1 60 ns		20
	41256 256K)	1 100 ns	10.95	20
	51258 PR 256Ks	1 100 ns	12.95	~
200	41256 256Ks	1 120 ns	9.50	-
2.	41264 N 64Ks	4 120 ns	14.50	39
600	FF	ROM		33
		e 200 ns	\$28.50	4.8
90	27C512 64K		13.95	
10	27256 32Ks	a 150 ns	8.15	6.5
10	27128 16Ks	a 250 ns	4.95	33
	STAT	IC RAM		
7	62256P-10 32Kx	s 100 ns	\$20.50	0
20	6264P-12 8Kx		9.75	23
	6116AP-12 2Kx	a 120 ns	5.50	22

LYS, 7 or AM 10 PM SHIP VIA PED-EX ON SAT. (918) 267-4961

CLE 561 ON READER SERVICE CARD

CALL DRAM CO.

- Volume Discounts 100% Guaranteed
- Dynamic RAMS 1M 120NS, 100NS, DIP & SOJ 256K 150NS, 120NS, 100NS & 80NS 64K 150NS, & 120NS

Policy: Price subject to d order \$20, MC VISA add 4% CA residents add 6.5% sales lax. UPS. Ground \$6. air \$7 (1 lb)

(415) 398-2987 Open M-F 9-6

P O Box 590127, SF, CA 94159-0127 CIRCLE M2 ON READER SERVICE CARD

PERIPHERALS





 Mainframe to PC Data Transfer
 High Speed Backup
 All Software, Complete System Service and Support, easy Installation

call (818) 343-6505 or write to: Contack Computer Corp. P.O. Box 153 Tarzana, Celif. 91356

CONTECH CIRCLE SIS ON READER SERVICE CARD

PERIPHERALS



OVERLAND DATA IS THE EXPERT when it comes to connecting your PC to the mainframe and mini computer world. OUR ENGINEERS DESIGNED the most

- successful tape drives in use today. PC/XT/AT/386/PS2/co
- 800, 1600, 3200, 6250 BPI · Free tutorial on tape systems
- · Fastest tape subsystems available EBCDIC/ASCII conversion
- IBM & ANSI labeled tapes
 DOS, XENIX, UNIX, PICK
- Highest quality customer service
 Quick delivery
- Software tools supplied
 Stock full range of tape drives
 Network backup and More!

Overland Data Inc.

5620 Kearny Mesa Rd. San Diego, CA 92111 Tel: (619) 571-5555 • FAX: (619) 571-0982

CIRCLE 584 ON READER SERVICE CARD

9-Track Tape Subsystem



MINISTREAMER"

Now you can exchange data files between your IBM PC/XT/AT and any mainframe or miniand any mainframe or mini-computer using IBM compatible 1600 or 6250 BPI 9-Track tape. Unit can also be used for disk backup. Transfer rate is up to 4 megabytes per minute on PCs and compatibles. Subsystems include 7" or 10½" streaming tape drive, tape coupler card, cables and software.

Jurlstar. 9621 Irondale Aver

Chatsworth, CA 91311 Telephone: (818) 882-5822 CIRCLE SAS ON READER SERVICE CARD

9-TRACK TAPE SYSTEMS!



9-TRACK TAPE

CONNECT!

- Completa ayatam manufacture Support PC/XT/AT/PS2 & Mac Read & writa 800/1600/6250 Uas with IBM, DEC, HP tapas Linka to FORTRAN, C, COBOL
- Links to FURTHAN, C. COBUC Networking capability Customized softwars available Powarful date extraction Large invantory of Anritsu, Cipher, Kannedy, Qualatar Fast technical support System prices from \$2995 Avoid the middleman—Go direct
- FLAGSTAFF 602-779-3341 ENGINEERING FAX 779-5998

PERFORMANCE PERIPHERALS TOSHIBA LAPTOP COMPUTERS

2 (0) bps Expansion Slot Internal Moderns for Tilling + Tilling Tilling Tilling Tilling Tilling N24EC-\$499 RJ11 & Acoustic Coupler packs N24ES-\$499 RJ11 pack, R\$232 COMMS DB-9 2+00 bps Internal Modern for Toshiba T1000 M2+RC-53+9, RH1 & Acoustic Coupler tacks 2400 bps Buil-In Modern for T1200 T1600 M2488-5299 RJ11 pack, power control mode COMMS-2 Expansion Stot Card. \$252E-\$199
 Dual COMMS Expansion Card. D242E-\$299
 SISI M2 1 O Expansion Card. \$252E-\$299
 COMMS-2 Internal T1000 Card. \$252E-\$149 AdaptaPOWER external hunors power packs and power adapters for the laptup computer

PRODUCT R&D Corporation 1194 Pacific #201. San Lais Dhopo. Ct 94401 Phone (805) 546-9713 FAX (805) 546-9716 CIRCLE SET ON BEADER SERVICE CARD

> PC Magazine Marketplace 2nd Color Option Available

PLOTTERS

Affordable Large Format Plotting



A-D

C-D \$1695

\$2295 (Sugg. ret. \$2695)

(Sugg. ret. \$2295)

A-E \$2695 (Sugg. rel. \$2995)

Features that say value ... Economical: \$1,000 less than other large format plotters.

Compatible: Operates with all popular CAD software supporting DM/PL.

Multiple Media Siges as small as 812" x It" or as large as 36" x 48" eliminates the need for a second plotter

Practical speed you can really use 10" per second assures good drawing throughput while optimizing the speed at which most plotter pens can draw

without skipping. CIRCLE 588 ON READER SERVICE CARD Repeatability and Resolution: .004 assures

quality suitable for the most demanding applications including PCB artwork. Vacuum Paper Hold Down guarantees

perfect registration. CALL NOW AND WE'LL SEND YOU A FREE SAMPLE PLOT. (415) 490-8380

ZERICON 40491 Encyclopedia Circle, Fremont, Ca 94538

MAGAZINE

POWER SUPPLIES

TURBO-COOL 150: Cool, Quiet Power



MODEL	POWER	COOLING	HOISE	PRIC
STANOARD IT	150W	1.00	STD	\$89
STANDARD AT	200W	1.0X	STD	\$105
SQ150 PC/XT	150W	1.4X	-44%	\$12
SQ200 AT	200W	1.1X	-69%	\$169
TC150 PC/XT	155W	2.21	-50%	\$145
TC200 PC/XT	200W	2.71	STD	\$18
TC250 AT	250W	1.8X	STD+	\$18

FCC, UL. 1201/240V, 4 drive plugs, heavy duty com-ponents, parented cooling system, 1 year warranty PC POWER & COOLING, INC. 31510 Mountain Way, Bonsall, CA 92003 (619) 723-9513 VISA/MC/COD/PO CIRCLE 589 ON READER SERVICE CARD

PRINTERS

ADD POWER TO YOUR LASERJET II FOR LESS Expandable Memory Boards: 1MB - \$ 277 2MB - \$ 579 4MB - Call Font Cartrid Z+ -\$209 123 -\$249 B/F - \$169 HP Plotter (HPGL) Emulation: - \$ 129 D.H. SYSTEMS, INC. 1940 Cotner Ave. Los Angeles, CA 90025 (213) 479-4477 VISA-M C SIRCLE 590 ON READER SERVICE CAR

SECURITY

INSURES FOR POWER SURGES!

When SArEWARE designed the original computer insurance policy. They decided to cover even the notorious POWER SURGES Today you can buy comprehensive, tull replacement protection against theft, accidents, fire, earthquake water ANO power surges for as little as \$39 a year Call for details & immediate coverage 1-800-848-3469 SAFEWARE, The Insurance Agency Inc.

2929 N. High Street P.O. Box 02211

Columbus. OH 43202-0211

SOFTWARE/ ACCOUNTING

DUICK & FASY PAYROLL

Automates weekly, bi-weekly, semi-monthly or monthly payroll for up to 200 hourly and or salaried employees Accepts time as hrs min All taxes + city, 401k, after-the-fact payroll, tips Prints checks W 2's Quarterly reports \$95 + 250 s.h Money Back Guarantee Visa MC Amex DC Gall, lax or write Phoenix Phive Software Corporation 7830 East Gelding Drive, Suite 400 Scottsdale, AZ 85260 800-331-1811 602 483-0991 or Fax 602-948-1379

MIP FUND ACCOUNTING

The MIP Fund Accounting System meets the financial and managerial reporting requirements of not-for-profit and governmental organizations The System features multiple fund and fiscal years, user-defined reports and six levels of account coding Modules offered G L A P A R. Payrox. Encumbrance. Expenditure Budget, Reve nue Budget and t otus/DBase Interface MIP FAS is available for IBM XT and compatibles MICRO INFORMATION PRODUCTS 505 East Huntland Or, Suite 340 Austin, Texas 78752 (512) 454-5004 1 800-MIP-FUND

dbase accounting tools

"GENERAL LEDGER "ACCTS PAYABLE "dINVOICER & A.R "SALES ANALYSIS SERVICE BILLING *OROER ENTRY JOB COSTING "JOB ESTIMATING INDANA, ABUTWANNINGO HUBINA \$99 ea + s&h w/dBASE 2, 3 or 3 + Source Code dATAMAR SYSTEMS 4876 P Santa Monica Ave San Orego, CA 92107 (619) 223-3344 Visa-M/C-AMEX-Check-COD

The leading fund accounting system for local govts and non-profit organizations. Modules include General Ledger, Accounts Payable, En cumbrance, Obligation Tracking, Accounts Receivable Payroll. Budgeting, Fixed Assets and Donor Receipts The system supports up to 99 funds 9999 depts PC-FUND runs on the IBM PC and most MS-DOS and XENIX computers AMERICAN FUNOWARE, INC. PO Box 773028

Steamboat Springs, CO 80477 (800) 551-4458 (303) 879-5770

BUSINESS

PC ORDER PAD

marter than a Cash Register Handles Cash and Charge sales Prints Receipt Picking slip Reports Sales totals with margins. Tracks inventory Easy & Fast On-line HELP Options include Bar Code or OCR Cash Drawer Network or Remote site versions Runs under MS/PC OOS Customizing available Dealers invited COLUMBIA SYSTEMS, INC. 113420 S.E. Hillcrest Orive Portland OR 97266 (503) 654-7722

BUSINESS TIME MANAGEMENT

Multiple Scheduling!

Scheduler II

Single and multiple schedules
Appt./Memos pop up on key word
Finds first or mulual openings Graphic display of month Flexible time intervals IBM Compatible \$19800 VISA

Executive Computer Systems 1571 Feapark * Fenion MO 63026 orders: info: (800) 727-0498 (314) 343-5757 CIRCLE 501 ON READER SERVICE CARD

> PC Magazine Marketplace 2nd Color

Option Available

COMMUNICATIONS

BARR High-Performance **RJE Workstations** BARR/SNA RIE and BARR/

HASP are communications hardware/software packages for the IBM PC and PS/2 series of computers.

- Full featured: · multiple printers. unattended operation.
- print speed beyond 6,000 lpm. · special forms.
- line speed to 56,000 bps,
- · dial-up or dedicated lines, and · serve as a LAN gateway.

BARR/SNA RJE emulates IBM 3777-3 in an SNA environment. BARR/HASP emulates IBM 3777-2 and HASP on the 360/20. BARR communications software is also available with PC-SYNC internal moderns: 208AB, 201C, 9600.

B/IRR

Barr Systems, Inc. 2000 NW 41 St. Bldg M Gainesville, FL 32606 800-BARRSYS or 904-371-3050

CIRCLE 808 ON READER SERVICE CARD

COMMUNICATIONS



Finally... An Office Network You CAN Afford!

• Printer Sharing (up to 18 PCs) File Transfer (speeds up to 4000 cps)
 Simple to Install, Easy to Operate

ExcellNET 1-800-284-8509

ExcelITECH Inc.
12% West 3rd Street, Yonkton, SD 57078
CIRCLE 592 ON READER SERVICE CARD

COMPUTER-TELEX-LINK Your PC can send and receive telexes quickly

and easily with Computer-Telex-Link Replace that aging telex machine! Add telex service to your business for cost effective worldwide communications! Computer-Telex Link transforms your PC into a state-of-the-art communications tool for telex

Cawthon Software Group 24224 Michigan Avenue Dearborn, Michigan 48124 Phone 313-565-4000

MULTI-LINE PC-DOS BBS

The Bread Board System (TBBS) - Secure, reliable, full-leatured commercial EIS for IBM XT:AT/386/PS2 or compatible Easily customized by non programmers. Kermit, X & Y - Modem High performance allows up to 32 simultaneous callers. User audit trait 300:1200/2400:9600 bps

eSott. Inc 15200 East Girard Avenue. Suite 2550 Aurora Colorado 80014

(303) 699-6565

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

CONSTRUCTION

CONSTRUCTION ACCOUNTING

Comprehensive, allordable software for builders and contractors. Job cost, billing and draws, payables, check writing, purchase orders, discount and retention tracking, all in one package \$795 Reviewed and approved by National Assn of Home Builders Also available: General Accounting and Payroll YARDI SYSTEMS, INC 813 Reddick Street Santa Barbara, CA 93103 805-966-3666

DATA BASE

ROOTS III FOR GENEALOGY

Organize your family tree and print camera-ready family books containing charts text and indexes Store, retrieve and display 1,000's of family facts with biographical sketches and source documentation Lightning-last searches and sorts 750 page manual Satisfaction guaranteed. Write for free brochure \$250 (+ CA tax) COMMISSIFT

2257 Old Middlefield Way, Ste A Mountain View. CA 94043 415,967,1900

800.327-6687

FAX PHONE DIRECTORY ON DISK More than 150,000 entries available containing

organization name, city, zip, industry code and FAX number Rates based on volume ordered Customized groups (by AC, city, zip or indus-(ry) available For information contact: HAMILTON WORLD COMMUNICATIONS PO Box 9777

Trenton, NJ 08650 FAX (609) 584-0048

dBASE III PLUS Workalike Free Trial, Send No Money

PC MAGAZINE MAY 17, 88' said, 1 en 1 is a programmable relational DBMS. faster operation in the interac-tive mode . . the menu mode is a lancier and more complete version of dBASE's Assistant mode . . 1 on 1 = 3 II is a great deal for those who would be glad to have a dBASE III PLUS clone

a do ASE III PLUS is lottle.

FREE 30 day has lide program, JUSA only) just write, or buy now, money back guaranee, Call 203-275-091 4 569 + 55 sh orbit/A/mEr

1 on 1 Computer Solutions, Inc. 26 Findmood Drive
Trumbul, CT 06611
6 BASE III PLUS is a trademark of Ashton-Tate CIRCLE 593 ON READER SERVICE CARD

TO PLACE YOUR AD IN PC Magazine Marketplace Call (212) 503-5115 or (800) 825-4ADS

DATA ENTRY

DATA ENTRY **EMULATOR**

Runs on Stand-alone or networke PC's, compatibles or PS/2's. You will not find any Data Entry System FASTER, EASIER to use, or LOADED with more USABLE features. Distribu tion Worldwide. Imbedded rev-10 key option. Fully menu driven. A complete edit language include Call for our free 30 day trial period. Price \$395 avail, for IBM AS/400 & S/36

COMPUTER KEYES 21929 Makah Rd. Woodway, WA 98020 TEL: 206/776-6443 FAX: 206/776-7210 USA: 800/356-0203

CIRCLE 595 ON READER SERVICE CARO PC Magazine Marketplace

2nd Color Option Available

Everyone is talking about RODE/PC from DPX

3

systems RODE/PC and the DPX organiza-tion stood out as clearly superior." - Computer Many

Six of the ten largest companies in the U.S. have selected RODE/PC. Call for your evaluation copy today. ■ DPX



20825 Mevens Creek Blvd Suite 150-P Cupertino, CA 95014 (408) 973-9292 CIRCLE 594 ON REAGER SERVICE CARG

KevEntry III

Using dedicated, on-line or older systems? Let KeyEntry III. the most widely used system IN THE WORLD, show you the full potential of PCbased data entry UNMATCHED leatures and capabilities Supports networked and standalone PCs Call today for complete Evaluation

Packagel Southern Computer Systems, Inc. 2732 Seventh Avenue South Rirmingham Al 35233

(800) 533-6879 or (205) 251 2985 VDE-Viking Data Entry

The premier data entry system Full-leatured to replace key punch & keydisks Full screen "FORMS," double-key verily, wide variety of options, crossloots, subtotals, batch balancing, duplicating, statistics, skipping, etc. Character, lield & record level validations. \$120-600 Also

for minis VIKING SOFTWARE SERVICES. INC 2815 East Skelly Drive, Suite 816 Tulsa, Oklahoma 74105 (918) 745-6550

DESK TOP PUBLISHING

We don't do newsletters

But if you're doing, 1,000-page technical documents, we're the best-automated, style-sheet-driven, sophisticated pagination slick publishing features, and camera-ready output.

GML/PC™

The technical documentation and specifications specialist. Command Technology Corporation, 1900 Mountain Blvd., Oakland, CA 94611 Telephone (415)339-3530 Telex:509330 COMMAND TECH

Trainable OCR Read printed pages into text files!



SPOT can be trained to recognize 1000's of typefaces in over 130 languages.

SPOT OCR Text Reader

Fast, Accurate, Low-Cost OCR. Works with most PCs & scanners

Flaastaff Engineering

1120 Kaibab, Flagstaff, AZ 86001 (602) 779-3341 FAX (602) 779-5998 CIRCLE 597 ON READER SERVICE CAR

Desktop Publishers! hen you need the best tools for Screen Capture and Image Management:

ollage₩ **Publishing Utilities**

Accurate, super-fast grayscaling, image brow within your applications, capture preview, EMS 4.0 support, and much, much moral Supports EGA, VGA, Hercules, CGA, MDA adapters. Suggested retail price, only \$20 95

IMI inner media, inc.

(603)465-3216 Voice, -7195 Fax Visa, MC, Am, Exp CIRCLE 598 ON READER SERVICE CARO

Optical Character Recognition (OCR) PC-OCR sollware converts printed/typed documents into editable text files for your desklop publishing system Supports HP Scan-Jet. Canon, Panasonic and most other desktop scanners. Pre-trained for many popular lonts and trainable to read virtually any typestyle, inct. foreign lonts Reads proportional text. matrix printer output and Xerox copies \$385

Check/AMEX/VISA/MC/COD Essex Publishing Co P.O Box 391 Cedar Grove, NJ 07009 (201) 783-6940

EDUCATION

WRITING ABOUT COMPUTERS

A book on a disk you can read with software. Requires a PC, XT, or AT with 128k memory. \$29.95

*Ariz. res. add sts/tax Send check or money order to **Maynard Desktop** Publishers, Inc. P. O. Box 82070

Phoenix, Arizona 85071-2070 602/993-1934

B.Sc. DEGREE IN PROGRAMMING

The American Institute for Computer Sciences offers an in-depth correspondence course which allows you to earn your Bachelor of Science degree in computer programming at home Subjects covered are MS/00S. BASIC, PASCAL, C. Data File Processing, Data Structures & Operating System Concepts AMERICAN INST for COMPUTER SCIENCES 1704-PC 11th AVE SO

Birmingham, AL 35205 TOLL FREE 1-800-872 AICS

TO PLACE YOUR AD IN PC Magazine Marketplace

Call (212) 503-5115 or (800) 825-4ADS

FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

FDUCATION

THROW AWAY YOUR **COMPUTER MANUALS!**

Learn Popular Software Programs With . VIDEO INSTRUCTION TOOLS

Lotus 1-2-3 (4 hours) \$ 99 95	WordPerfect 5.0 (5 hours) 129.95
DOS 3.3 (3.5 hours) 129 95	WordPerfect 4.2 (3.5 hours) 99 95
PageMaker 3.0-PC (2.5 hours) 199 95	Ventura Publisher (2 hours) 179.95
Dbase III+ (4 hours)	Ventura Techniques (2 hours) 179 95
DisplayWrite IV (3 hours) 199.95	Symphony (3.5 hours) 199.95
Enable (4 hours) 199 95	Intro To IBM/PS 2 (3 hours) 199 95
Intro To IBM-PC/XT79.95	MicroSoft Works 79.95
Intro to Spreadsheets 59.95	Q & A79 95
HyperCard - MAC	PageMaker 3.0 — MAC 199 00

- Self-contained, interactive training videos.
- · Demonstrates every command in detail. · Perfect for group/repetitive training.
- · Thousands of satisfied users!

Ask about our 60-day unlimited phone support hotline.

MICHAEL HALVERSON & ASSOCIATES FOR PRODUCT INFORMATION burgh, Westland, MI 48185 (313) 729-0325 FAX. (313) 729-0238

1-800-537-1641 MAJOR CREDIT CARDS ACCEPTED

Visit our display at Spring Comdex; April 10-13, McCormick Place, Chicago

CIRCLE 500 ON READER SERVICE CARD

ENGINEERING

ENG/SCI GRAPHICS

OMNIPLOT(S) (screen graphics) & OMNIPLOT (P) (plotter driver) provide integrated engineerscientific 2-D & 3-D graphics with NO PRO-GRAMMING REQUIRED! Menu-driven, flexible, professional. Choice of formats: tabular/line, contour, bar. pie, 3-D wire frame & much more! OMNIPLOT(S) \$195, OMNIPLOT(P), both \$295. MICROCOMPATIBLES, INC.

301 Prefude Drive Silver Spring, MD 20901 (301) 593-0683

ARCHITECTS AND ENGINEERS

The AEMAS system is designed for Architects. Engineers & other firms where monitoring project costs is required Modules Include: Job Cost, Payroll, A/P, A/R, Invoicing, Personnel Scheduling, Report Generalor and General Ledger Multi-terminals are available. DATA-RASICS

11000 Cedar Road, Suite 110 Cleveland, OH 44106 (216) 721-3400

PC Magazine Marketplace 2nd Color

Option Available

SIMULATION

GPSS/PC is a full-power version of GPSS, the most nonular mainframe simulation language Specifically designed for interactive use on today's high-speed microprocessors, it is loaded with features such as interactive graphics and animation Using GPSS/PC, you can predict the behavior of complicated real world systems. MINITEMAN SOFTWARE P.O. Boy 171/B

Slow, MA 01775 800-223-1430/508-897-5662 Ext 316

ENTERTAINMENT/ GAMES

SPORTS HANDICAPPING SOFTWARE \$\$WIN with horse racing & greyhound handicapping software \$32.95, \$52.95, \$67.95, \$77.95 each. Up to 17 entries analyzed: class, speed, times, odds, Irack, post, stretch, & finish. Pro Football. Baseball. Basketball Software- \$52.95 Handicap races & games in minutes. MC/VISA accepted. Free info. SOFTWARE EXCHANGE

P.O. Box 5382-PC W. Bloomfield, MI 48033 (313) 626-7208. Order. 1-800-527-9467

ENTERTAINMENT/GAMES

The COMPLETE Lottery TRACKER and WHEELER™

The MOST COMPREHENSIVE Lottery Software Program on the Market Today for PICK-6 Garnest New Sold In all 58 states and 17 Fereign countried

Store Past 1000 Winning Lottery Numbers and Dates!

Since rask incol winning Licery reunious are users as you want! No Limit!
 Produce EXPERT Trend Charts to Indentify Those HOT and DUE Numbers!
 Analyze Hits 4 ways: Bell Curves, Recency, Percentages, Frequencies, MORE!
 Produce STRISTICS for ALL Numbers You Play — NO Randomizing Here!

Products SIAI SIAS OF ALL Numbers Vary Integr — NN Handomizing Here!
 Select Numbers to Play 5 Different Ways! You Choose what YOU Lies Best
 Check Your Best For WithNING Combinational Record ALL Systems Played
 Store up to 2 BOWLS NUMBERS (Play all international games)
 We include Lottery Data Base for State Game of YOUR CHOICE (Please specify)!
 Print Charts, Statistics, Recorded Numbers and WHEELING SYSTEMS!

Choose From the Worlds MOST Popular WHEELING SYSTEMS! No other lottery software package provides all of these leaturest When we say complete, WE MEAN COMPLETE Easy to use MENU DRIVEN SCREENS. Printer and Color Monitor recommended but not required for use. At wheeling systems and program features take enly SECONICS to complete! Detailed Lottery user manual included. Why pay more for

Use our Years of experience with Your computer advantage! 'T Hit 54 CASH PRIZES the first 8 weeks with the help of your program? The Wacter and Wheeler IS the BEST lotter's software program I have used overall. John \$2700 shade after ALL expenses?" 8.C. & Bhaob, TX " won 4 cash prices the first 2 knest is used the Racker and Wheeler?" 8.L.M. Willimpton, DL

The COMPLETE LOBBRY TRACKER and WHEELER IS SPECTACULAR! F.D. New York NY Don't Hesitate! Place your Order Now! ONLY: \$39.95 Plus \$2.00 S&H MCMsa Call fol Free 1-800-824-7888, Ext. 283

For Canadan Caters: 1-800-544-2600
Entertainment On-Line®, Inc. PO. Box 888, Dept. PC, WA The PREMIERE Lottery Software and Audio Products Comp.
MC, Visu and MD orders shipped within 1 week. Please allow 2 weeks for Personal C
MA Residents and 5% sales last. © 1988 Entertainment-On-Line*, Inc.

Order Direct or see Your Local Software Dealer. CHICLE YET ON BEADER REPORT CARD

LOTTO EXPERT® VERSION 2.0 In Pursuit of Fame and Fortune

"This is where Lotto Expert" separates the men from the boys . . ." PCM Magazine
"A full feature program . . ." Miami Herald

By providing a comprehensive and outplocked set of features. A with increased capabilities. LITTE CREATE TO CONTROL AND A CONTR

CIRCLE 752 ON READER SERVICE CARD

RUN COLOR GAMES on your mono monitor TO PLACE YOUR Works with any monographics card. Runs mo all CGA programs, even self-booting ones. Ti

as CSA programs, even ser-cooming ones. The best performance for your mone XT or AT system-works gread Realistic and very usable-even for fast moving games. These Work: BASICA, Fight Simulator, GRASP, PACMAN, ZAXXON, LODERUNNER, PrinShop, etc.

\$29.95 00-0010

1-800-854-0561 ext 854 (orders) \$1.00 ahpping CA nee and \$1.00 MCCVSA Wilkinson Software 7801 Sky Park Circle, Unit B, Irvine, Ca. 92714

(714) 724-1230 CIRCLE 754 ON READER SERVICE CARD

Call (212) 503-5115 or (800) 825-4ADS

AD IN

PC Magazine

Marketplace

PC MAGAZINE # APRIL II, 1989

ENTERTAINMENT/GAMES

If You Play Games: You Need GameMaster™!

New Yer, 1.5 of GraneMaster <u>removes</u> the copy protection from over 199 of the most popular PLD and it is only \$4.00 \$\frac{1}{2}\$ but shipping. It has a way show a stack of game distant and run your games from RAM disk. Make 3.5" copies for your portable computer. Don't be without a copy of GameMass For IBM 75: and conspitities using DOS 2.0-3. X

To order your copy today: call 1-(407) \$47-0790

FAX (407) 547-0798

or write to: PCEasy, Inc., 7570 South US HWY #1 Suite 2, Hypotesto, FL 33462.

Ask about UNlock Master Key™ for removing copy protection from over 200 business & engineering programs. Only 599.95 plus shipping, or order both for \$130.00 + shipping. CIRCLE 755 ON READER SERVICE CARD



ADULT SOFTWARE
25 vol. CGA / 10 vol. monographics,
27 vol. cGA / 10 vol. monographics,
27 vol. set (39 25 of Monographics vol.

CIRCLE 756 ON READER SERVICE CARD



GAIL'S SYSTEMS.

Only this book has over 100 casy to use Call Howard Systems with:

Valid Malieroum Wis Guarantes

*EXACT Guaranteed ODDS

IMPROVEMENT UP to 66 7%

*Multiple with each system (ONL'y \$14.95 *32 s/h)

FOR YOUR COMPUTER
GAIL HOWARD'S SMART LUCK
COMPUTER WHEEL*

GAIL HOWARD'S SMART LUCK COMPUTER ADVANTAGE"

Pick the best numbers to play in your favorite state or loternational Lotto game (\$7 for each additional Lotto game) Please specify \$39.95+\$2 s/h.

DEMO DISK AVAILABLE for your evaluation of Gail Howard's SMART LUCK COMPUTER ADVANTAGE"—\$5.00. Cash or

SMART LUCK

PO. Box 1519 Dept. PC-11 White Plains, NY 10602 (800) 876 G-A-I-L (4245) charge orders only (312) 934-3300

CIRCLE 756 ON READER SERVICE CARD

ther lottery computer system offers so much! in also checks for wins \$29.95-\$2 s/h

ADULT SOFTWARE For IBM PC, XT, AT PS/2 & Compo World's Largest Distributor Now-Same Day Shipping

9 ... \$11.95 ppd \$11.95 ppd \$16.95 ppd \$5.00 each ppd \$5.00 ppd

LOTTERY JACKPOT WINS! NOT JUST DUMB LUCK Gall Howard high book — LOTTO: How to Wheel A Fortage give, you the but ambrematical information available on how to improve your odds of WINNING THE LOTTERY AT ELAST 13 MAJOR LOTTO PRIZES (INCLUDING WIRST PRIZE) ACKNOTS TUTAL LING SAF 2 MILLION, WERE WON USING CALLS NOT THEM. FINANCIAL

COLLECTION AGENCIES Comtronic

DEBTMASTER ng All Types of Third-Party Debts. Completely "cardless." Instant on-line work schedules. Advanced power and flexibility Unlimited clients, debtors, accounts

and collectors. Networks any numb of workstations. Excellent service and support. National distribution Dealers inquiries are welcomed

Comtronic Systems 33305 First Way South, Suite 210 Federal Way, WA 98003 206-874-4034

TIORNEY

LOAN PLUS

Fully menu driven! UserFriendly! Organizes all phases of Loan Processing. Fasy to track payments. Processes five types of Loans, including Rule of 78. Produces Amortization Schedules. Payment Receipts & Invoices, Late Notices, End of Year Statements, Loan Collection Report, Labels, etc. PC/MS-DOS/256K Demo \$9.95 + \$2 s/h Operating System \$695 ADVANCED PERFORMANCE Inc c/o Vickery Software

102 Court St Pickens S C. 29671. 803/878-2100 FINANCIAL.

MoneyCounts® 5.0 The \$29 Money Management Solution Guaranteed

MONEYCOUNTS 5.0 is the easy-touse, CPA-designed money management/accounting program ne and business. It offers Cash, checking, savings & credit

Cash, checking, savings & credit card management, checkbook balancer, budgeting, financial atatements, graphics, faat financial data base with three-way look-up. inquiry reports & on-line help. Handles up to 999 accounts and 100,000 transactions. Includes printed monuel, Het copy protected.

MONEY COUNTS 5.0 also

- prints any type of pin-feed or laser check & updates your records automatically estimates your 1988 income lax
 - analyzes financing options & savings programs - computes interest rates & loan payments

- prints amortization schedules
- manages mail lists zip & alpha sorts prints labels & index cards
- provides password protection.
 fiscal year support & pop-up 30 day money back guarantee

(minus shipping) Call or send \$29 plus \$5 shipping/handling Check/VI5A/MC/C.O.D

1-800-223-6925



373 Collins Road N.E Cedar Rapids, Iowa 52402

CIRCLE 750 ON READER SERVICE CARD





Editors.
Choice:
Choice of computerized technical analysis. MetaStock** Professional offers a wide variety of sophisticated charting tools for stocks, bonds, commodities, futures, indices, options and multial funds. \$295.

- . Up to 36 multiple, movable windows
- Up to 36 multiple, movable window
 40+ pre-programmed indicators
 Compatible with 16+ data services
 Desktop publishing compatible
 Create your own formulas
 - For a \$5 demo disk, or for complete literature, call toll-free.
- · Profitability tester Import/export data
- Unattended operation
 Supports over 130 printers
 Extensive user's manual

1-800-882-3040

EQUIS International Inc. Box 26743, S.I. C. UT 84126, 801-974-5115



CASHTRAC® palancing program I'm seen yet, at any price —PC-SIG Megazine

16 checking according 255 investment a

255 Investment accounts
Unpaid bill acheduler
On-line help
Op-up calculator
Prints 12x reports & bar charts
Prints 12x reports & bar charts
Prints 2x reports & bar charts
Spreadsheef & data base intartsca
Detailed printed manual
Voica and E-mail tech support

THIS ONE DOES IT ALL. No other modules needed, \$45, 5/H Included.

Call 301-948-9599 or write Column Ona, Inc P O Box 2607, Gathersburg, MO 20879 VISA MC Download a shareware retrion lage by mo from our E-mail system at 703 841 2366 or 941 5834 CIRCLE 761 ON READER SERVICE CARC

Historical Stock Market Data For use with spreadsheets & Charting Software MOLLY with over 150,000 daily prices (4 Mbytes) on major indexes . Many from the 1920s. Including all 3 Dow Indexes, S&P 500, Int. Rates . NYSE Advance/Declines and more for \$199.95.

ECONOMIC Database with 160 data series, most begin in the 1940s, for \$159.95. INTERNATIONAL Index Detabase. Tokyo, Lon-

don, Hong Kong, Toronto and marry more (14 total).
All daily from 1980 some include daily yield & P/E rating From \$200 Filles are in WK1 format IRM 8 Mar. Demodisk \$5.

Guaranteed! MarketBase Inc. 250 W. 90 St. Suite 12K New York, NY 10024

1-800-MARKET 5

CIRCLE 762 ON READER SERVICE CARD

TO PLACE YOUR AD IN PC Magazine Marketplace Call (212) 503-5115 or (800) 825-4ADS

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

FINANCIAL

Legal, Finance, Real Estate EXEC-AMORT TM

- Used by thousends of Attorneys
 Used by hundreds of Banks
 Used by bug CPA's
 Used by big CPA's
- Used by big CPA's Incider's Rigurest!
 Lona Montistanton | Present Visible
 LAPI'S comply to
 US Riguidator 2 | Net Present Visible
 US Riguidator 2 | Net Present Visible
 Used to the Complete Present Visible
 White Complete Present | Visible Laper Price
 Long Annual Complete |
 Long Annu
- Belloon Payments vices!

 Belloon Payments | FREE Reg. Z compliance benchmark test with purchase! Only \$149.95 + \$5 S&H.
 semo disk & manual available for \$30-\$5 S&H

 ELECTROSONICS
 - 36380 Garlield #1, Fraser, Mich 48026 800/858-8448 or 313/791-0770 Check Visa MC, Amex & Discover are welcome

60 day money back guarantee!! CIRCLE 763 ON READER SERVICE CARD

FLOWCHARTING



Flowcharting FLOW CHARTING is new! It's now Flow Charting

II+, with more speed + more functions + more printing

- options:
- 10 text fonts; 26 shapes;
 10 text fonts; 26 shapes;
 Line mode can stop at a shape;
 Backspace key can erase a line to its origin;
 Free text entry anywhere, or select
- auto-centering; Vertical or horizontal printing; one chart or multiple charts.

Used by Fairchild, Bechtel and more than 500 other major corporations. Edit quickly and accurately - even major edits with Flow Charting II+, the Specialist See your retail store or call:

PATTON & PATTON

1-800-525-0082, Outside California 408-629-5376, California/Int'l.

CIRCLE 764 ON READER SERVICE CARD

FLOWCHARTING

BETTER FLOWCHARTER

Know before you buy! EASYFLOW is the superb flowcharting program chosen by over 30,000 users, and very favorably reviewed in the March 10th 1987 issue of PC Magazine. See the "Index to Advertisers" under HAVENTREE to find our farge display ad in this issue. Now available with 30-day MONEY-BACK quarantee HavenTree Software I imited Order Desk: 1-800-267-0668 Information: (613) 544-6035 Teletay: (613) 544-9632

GRAPHICS

35mm SLIDES-In 24 Hours

We transform your PC-Graphics files into full color, 35mm, 4000 line resolution slides and ship within 24 hrs. All popular PC-Graphics Packages supported Files accepted by modern. FREE FEDERAL EXPRESS on all orders of 20 + slides! Only \$8 per slide Accent Presentations, Inc. 990 Highland Drive, Ste 202 P.O. BOX 1303 Solana Beach, CA 92075 1-800-222-2592

35mm COMPUTER SLIDES - \$5.95

Design your own presentations with your PC and popular graphics software packages (Freelance Applause Harvard Graphics, etc.), We convert your graphics files into boardroom quality, 4k resolution slides. Finished slides on your desk in 24-48 hours Files accepted by modern or disk 800-433-8829 for free kit IMAGE CENTER INC. P.O. Box 2570

Roanoke, VA 24010 703-343-8243 • Telex: 7407469

STANDARD GRAPHICS

PC VDf graphics toolkit. Optimized, ANSI, ISO CGT compatible. Mapping, arcs, lext, orient, align, font loading, figure fill, image, bundles & hundreds more. Segmentation, raster, input option set, Drivers. Works with most "C", MS FORTRAN" "DuickBASIC" EGA/VGA Demos. Manual. \$395 Amex Ask about OS/2 ver.

NOVA INC P.O. BOX 68976 Schaumburg, fl. 60168 312-882-4111

35mm SLIDE FROM YOUR PC

COMPUTER SLIDE EXPRESS converts graphic files produced on the IBM PC into brilliant 35mm color slides with color resolution 400% better than your monitor. Leave your printouts behind Use high resolution color slides up to 4000 line COMPLITER SLIDE EXPRESS \$9/slide VISUAL HORIZONS 180 Metro Park

Har.

Rochester, NY 14623 (716) 424-5300

GRAPHICS

STOPS STRETCH FROM AUTOCAD VENTURA-PRINT SHOP-PMASTER-TAXVIEW PLUS 100's OF 9 PIN GRAPHICS PROGRAMS.
PRINTS ALL GRAPHICS IN LQ. Supports 60 Printers

Recommended by Epson, NEC, Recommended by Epson, NEC, Panasonic, Seikosha, Star, Toshiba.

Autodesk, Softview and more.

Secondide, CA 92925 CIRCLE 765 ON READER SERVICE CARD



GRAFPLUS" wer Pack Your PreSC Key Only \$49.95

Grafplus" turns any IBM or companish graphics application into a powerful communicator by printing exactly what you have created on your computer

- Link into Pagemaker or Vents · Print in color, black-on-white, white-
- Prine vertically or horizontally dot marrie, laser or infriet name

Jewell Technologies, Inc. 4740 44th Ave. S.W Suste 203 Search WA 98116 206-037-1081

RAINDROP™

FAST flexible easy to use compact T-S-R utility to send screen graphics to your 9 or 24 nin dot matrix, ink jet, or laser printer. Create quality b/w or color printer graphics from applications AND user written programs Fulf 24 pin support. Many options. Complete driver library \$39.95

RAINBOW TECHNOLOGIES 8106 St. David Court Springfield, VA 22153 703-440-0064

(301) 593-0683

FORTRAN/PASCAL GRAPHICS

GRAFMATIC (screen): Microsoft Fortran/ Pascal R-M Lahey callable routines Graphics primitives, total 2-0 plot support, 3-D plots and solid models. FGA/CGA Hercules mono. suoport. HP/HI plotter? PLOTMATIC. Laser, dol matrix printer? PRINTMATIC. \$135 ea. Any 2, \$240, all 3, \$340. Ask about our 15 fonts MICROCOMPATIBLES, INC. 301 Prelude Drive Dept PC Silver Spring, MD 20901

PRINTED GRAPHICS WITH TURBO

GRAPHLINK does for your printer what TURBD PASCAL's BGI graphics does for your screenin ultra-high resolution! GRAPHLINK commands work exactly like TURBD's BGI commands, so adding printed graphics to your programs is a snap-and requires only two additional lines of code! Supports HP, Epson, IBM, NEC & Toshiba printers. Only \$95 + \$4 s/hl VISITECH SOFTWARE

D5 3807 Ridgewood Ct. Pittsburgh, PA 15239 412/733-4775



Interactive Graphics & Statistics

Create graphs the way you want them. 35 graph types can be used to create numerous renditions. Make posters and flow charts— with full screen editing of text.

- · Vary character font, size,
- position, color Stack and overlay graphs · 3-Dimensional graphs: fishnet
- £ contour · Linear & Non-Linear Regression
 - Stochastic Distribution · Independence Testina - Descriptive Statistics
 - Contact: Scientific Programming Enterprises, P.O. Box 669, Haslett, MI 48840 (517) 339-9859 CIRCLE 766 ON READER SERVICE CARD

BUSINESS GRAPHICS PLUS!

GRAPH-IT, a full menu driven spreadshe w/formula justification, creates 2-0 & 3-0 Graphs incl hor/vert Bar Line Pie. Area. X-Y. Stock Hi-Lo, Linear Regres., Combos & more. Also add notes to graphs. Great for presentations, User Manual, Specify 5-1/4" or 3-1/2". \$37.50 + \$2.50 s/h SHADOW SOFTWARE 6 Williams St. Dept. M. Peguannock, N.J. 07440 201-694-4976

AMAZING TECHNICAL GRAPHS! --- Introducing Axum "

Discover how easily you can create publicationquality scientific graphs on your PC ultra-high resolution, color, 2D & 3D

 import Lotus/dB/etc., export WP/PgMaker · analyze, explore, display, customize · intuitive menus, online help, interactive

60 Day Money Back Guarantee \$495 etrx, Inc. (800) 548-5653 ext 234 444 NE Ravenna, #210PC (206) 527-1801 in Wa Seattle WA 98115 (206) 547-0328 FAX

HEALTH

ANALYZE DIETS, MENUS &

so much more! with The FOOD PROCESSOR III This TOP-rated software has the best database of any system on the market loday! Acclaimed by schools-colleges-hospitals-homes-litness centers & businesses 2400-3000 loods-30 nutrients \$250 IRM Annie Macintosh CALL OR WRITE TODAY FOR FREE DEMO DISK! **FSHA Research** P.O. BOX 13028, Dept. M

CALEM OD 07300 (503) 585-6242/7755

Diet Analyzer Ideal for weight control, menu planning, special diets, recipe analysis. Tracks calories, sodium, cholesterol, liber, + 20 others for 1000 foods (incl. many fast loods) & 100 exercises. Can add more. Multi-day averages, \$49.95 + 2.50 s/h. 30 day trial AMEX/MC/VISA/Chk Demo disk \$5. Free catalog Natural Software Limited

129 Pearsall Place Ilhaca NY 14850 800-626-2511 607-272-0157 (NY)

DIFTWISE/ENERGYWISE

- For Diet Nutrition, Fitness conscious people
- DIET Evaluation (children and adults) MENU Analysis
- RECIPE
- BOOY COMPOSITION
- FNERGY EXPENDITURE MS/DOS \$39-\$120 (professional vers. avail.)
- NUTRITIONAL DATA RESOURCES P.O. Box 540
- Willoughby, Dhio 44094 BOO-NOR-OIFT

Ohio (216) 951-6593

INVENTORY

dFELLER INVENTORY

A business inventory program written in modifiable dBASE source code. The menu-driven program lets you locate items by inventory name or number. It keeps track of reorder points, vendors, average cost & other information

dFELLER Inventory \$150/Requires dBASE II/III dFELLER Plus \$200/with History & PO's. Requires dBASE III-III PLUS (for stock rooms) FELLER ASSOCIATES 550 CR PPA, ROUTE 3 Ishpeming, Mt 49849

INVENTORY MANAGEMENT

*** (906) 486-6024 ***

Stock-Master 4.0, commercial grade system provides Stock Status, Purchase Order Writing & Tracking, Trend Analysis, Quality Control Reporting Detail Analysis, Bill of Materials, Multi Locafings and more Modular "micro" priced & configured to your needs. Cobol Source available. APPLIED MICRD BUSINESS SYSTEMS 177-F Riverside Ave.

Newport Beach, CA 92663 (714) 759-0582

INVENTORY

POINT OF SALE INVENTORY PROGRAM Maintains 10,000 Item Inventor

Opens Cash Drawer Prints Sales tickets on 40 and 80 column Printers Fast Easy to Use Supports Accts Receivables and Mailing List programs

\$89.50 35 inventory & UPS shipping programs

Cash drawers & receipt printers Freeman Software * Garland, Tx

800-426-6598 CIRCLE 767 ON READER SERVICE CARD

MAILING PROGRAMS

MAIL ORDER MANAGER (MOM) It you need order processing, list management

inventory control, and query-driven profit analysis, MDM is lor you. And, we're NETWORKEDmultiple order entry stations, we do it! Most competitors can't Clipper compiled, dBase III Files. \$895 Slide Show demo FREE with this

ad. Working demo \$45. Dydacomp Development Corp. P.O. Box 641

Wayne, NJ 07474-0641 (201) 694-0779

POSTWARE MAILING SYSTEM

Automate mail preparation. Cut postage costs by 5¢ per piece or more. Only PostWare prints address labels in bundle and bag, bulk maili order NoI a useless zip code sort. Prints address labels, bag tags/tray labels. Calc postage Works with dBase III PLUS DATAFASE PowerBase, Smart & others, Also ASCII. * 1st & 3rd Class-\$195 * 2nd class-\$395

* Carrier Route \$300 * Dup. Detector \$200 Postal Soft Inc. 515 Oivision Street

La Crosse, WI 54601-4544 800/831-MAIL (6245) 608/784-3500

THE MAIL ORDER ACCOUNTANT Order fulfillment/List management Includes customer lists, labels in 6 formats, inventory, invoicing, accounts receivable, customer payments by cash/credit card Prints shipping labels, credit card slips, UPS shipping manilests sales tax report, dBase III Plus source code provided. \$975, demo \$25 + \$3.50 S/H. GDI DSMITH & ASSOCIATES 48 Shattuck Square, Suite 86-B Berkeley, CA 94704

(415)540-8396 PC Magazine

Marketplace 2nd Color Option Available

MAILING PROGRAMS

Speed Up UPS Shipping with ShipMate

Intro Offer \$395

UPS Approved—Prints COD tags, labels, and manifest. PC Synergy ● 1805 Cottonwood ● Carlsbad, CA 92009 (619) 931-0350

"It's so easy-even the boss can use it!"

CIRCLE 768 ON READER SERVICE CARD

The Mall Order Wizard

is one very powerful program. Il offers a catalog business all the computing routines it needs and then some!...gives new meaning to the hackneved phrase, 'user friendly', Written in Assembler, if operates with lightning speed very serious software, a must see "Catalog Age, \$970, Demo, \$12 The Haven Corporation RO2 Madison Dent M Evanston, IL 60202 (312) 869-3434 or (800) 782-8278

MANUFACTURING

THE FOREMAN

Multi-user Now Available! Inventory/BOM/PO/Costing

- MRP/Invoicing/Ad hoc reports
- · Repetitive mlg or one time build Extensive Cost Control: Standard vs. Actual
- Automotive release interface IBM PC/NOVELL/ALTOS DCM COMPUTER PRODUCTS. INC. 43700 Twelve Mile Road

Novi. MI 48050 (313) 347-9600

pc/MRP

pc/MRP can make life easier by tracking every aspect of your growing concern, pc/MRP's integrated modules include accounting, sales purchasing, inventory, receiving, stockroom, bills-ol-malerials, invoicing/billing, and customer/vendor address book pc/MRP integrates information from each element of your business into a unified package. *Working Demo Pkg complete with manual \$25 *Single User Package \$295 00 Complete *Multiuser Package \$695.00 Complete SOFTWARE ARTS CONSULTING

P.O. BOX 3621 Santa Clara, CA 95051 (408) 248-6445 Call for Iree literature

MEDICAL

COMPUMEDIC "

PROVEN Practice Management System-in use 8 yrs. Electronic claims, A/R, A/P,G/L, scheduling, statements, insurance forms, practice analysis, word processing, recall, delinquent tracking, historical data FLEXIBLE! user designed forms/ reports Call for pricing Dental (DentalWare "1) eyecare/optometry (EyeMate **) & Vet. (Vet-Logic **) also avail Dealer inquiries invited OATA STRATEGIES, INC. 17150 Via Del Campo Suile 203 San Diego, CA 92127 (619) 451-0480

MEDICAL

rids: the power and flexibility of MOX dical-office software in a PC-DOS medical-innes somaram in a travalo format. Flexes for any speciality; manages billing, electronic claims, custom reports, medical records, more. Full upgrade path to MOX with UNIX/Xenix. Call for Info and free

CALYX CORPORATION

I. Sunnyslope Rd., Brookfield, WI 5300 (800) 558-2208 or (414) 782-6300 CIDCLE 760 ON BEADER SERVICE CARD

MedicAide

Complete A/R Patient Billing System with · Billing Statements & Insurance Claims

- Flexible Adjustments for Ease of Use
- · Practice Mgmnt. Reports with Graphs 99 Doctors & 99 Fee Schedules
- Word Processing with MailMerge Excellent VAR/CONSULTANT Opportunity

\$19900 - 30 Day Money Back Guarantee

(6O2) 421-1287 1915 Avenida De Palans évite 3

Casa Crando NZ 85222 CIRCLE 770 ON READER SERVICE CARD STAT MEDICAL SYSTEMS

STAT modular systems grow with your medical, dental or ophthalmic practice \$195 Base system: patient data base, recalls,

report generalor, letter writer & more \$395 Point of service transaction processing (superbills, financial reports, receipts) \$395 Patient billing module (statements)

\$695 Automatic 3rd party billing, tailorable claim forms with ICD/procedure codes tree Full featured demonstration disk & doc. ***30 day money back guarantee

GAMMA Incorporated Three Dundee Park Andover MA 01810 (508) 470-0080



MUSIC



Voyetra 333 5th Ave, Dept C. Pelham, NY 10803 (914) 738-4500 ed for our free PC Music cate RCLE 771 ON READER SERVICE CARD



FORTE I/II MID! Sequencers

16/32 tracks 16 channels/track Record/ Playback, 1.000,000 notes, Most powerful MIDI editing. Rhythmically flexible Step entry Auto Punch, quantization, realtime playback control, DOS shell. New in FORTE II: System exclusive storage, unlimited looping, SMPTE cue list, Songlist, Accel/ritard \$150/\$250 LTA Productions

P.O. Box 6623 Hamden, CT 06517 (203) 787-9857

SONGWRIGHT IV

Music Processor prints professional sheet music, songs, scores with text, chords, symbols. Compose, edil, copy, record, transcribe, play. transpose to any key Bass/freble, multiple staves, all meters MtDI optional IBM/Epson/ Star printers: CGA/Hercules graphics \$89.95 Send for free sample output SonoWright Software Route 1, Box 83

Lovettesville, VA 22080 (703) 822-9068

PREVENTATIVE MAINTENANCE

Memory Minder

Memory Mrinder Memory Influence Memory Holder is the most comprehensive disk diagnostic program available for mercomputers, and operator can quickly and memory memory memory memory memory memory disk district for memory district for the first force of the firs

J&M Systems, Ltd. 15100-A Central SE

suquerque, New Mexico 87123 505/292-4182 We accept MasterCard and Visa CIRCLE 773 ON READER SERVICE CARE

MAINTENANCE & INSPECTION

An easy-to-use computerized method to organize. operate, and control an effective preventive maintenance system. Applicable to any type of business or industry. Full screen input and displays. plus function key help command. Maintains historical data creates work orders and provides numerous reports. For info, write to: PENGLIN COMPUTER CONSULTANTS P.O. Box 20485

San Jose, CA 95160 (408) 997-7703

FAY 408-027-0570

PROGRAMMERS TOOLS

MC 14 3 10 10C L 10 3 3 CH 3 CODE MASTER

beginning over negative. Compile Fast Bar Code

- Printing Into Your Programs With Code Master
- Prints UPC: Code 25, 39, 128, odabar; and more.
- Supports C. Clipper, DBase Basic, and months

\$14900 \$24900 Wison P.O. Box 634, Eau Claire, WI 54702 (715) 833-2331 FAX (715) 832-2700 CIRCLE 774 ON READER SERVICE CARD

Opt-Tech Sort/Merge 3.0

Extremely tast Sort/Merge program. Run as a DOS command or CALL as a subroutine Unlimited filesizes, most languages, datatypes & filetypes supported including Btrieve and dBASE II & III. Advanced features include record selection, record reformalting & much more! Call or write for more into. MS-DOS \$149 Zenix \$249 Opt-Tech Data Processing P.O. Box 678 Zephyr Cove, NV 89448 (702) 588-3737

PROGRAMMERS TOOLS

QuickBASIC Programmers

We are the leading publisher of Programmer's Tools for QB. Our specialty is assembler subroulines, and we even have a package that lets you make your QB programs memory-resident in as tittle as 8K of memory Call Tol Free or write for detailed information with no strings attached.

1-800-922-3383 • 404-552-0565 • CALL M-F, 9-6 Eastern Time MicroHelp, Inc. • 4636 Huntridge Drive • Roswell, GA 30075

CIRCLE 775 ON READER SERVICE CARD

FRFF

BASIC Programming Magazine

Crescent Software, the leading manufacturer of BASIC tools and utilities is pleased to offer a copy of our QuickTALK magazine. More than just a catalog, it contains feature articles, tios and tricks, and of course a complete description of our products. Please call or write for your free copy!

Crescent Software

11 Grandview Avenue, Stamford, CT 06905 (203) 846-2500 CIRCLE 776 ON READER SERVICE CARD

Borland Programmers CREATIVE INTERFACE TOOLS

Create graphic mouse cursors. symbols, bit-mapped character sets, and dynamic, self-calculating menus in text or graphics

Control program flow with keyboard or mouse Supports Turbo C, Turbo Pascal,

Turbo Prolog and Turbo Basic Three features, one price: \$69.95 1-800-622-8366

Maxx Data Systems, Inc. 1126 S. Cedar Ridge, Ste. 115 Duncanville, TX 75137

CIRCLE 777 ON BEADER SERVICE CARE

FREE BUYER'S GUIDE

Call or write for your FREE comprehensive Buyer's Guide which contains descriptions of over 800 software products from tions of over 800 software products from more than 300 manufacturers, plus infor-mative articles by some of todays industry experts. Programmer's Connection has supplied the professional programmer since 1984 with quality products by offering unbiased advice, low prices, fast delivery and no hidden charges.

Programmer's Connection 7249 Whipple Ave. NW

USA 8 Canada	00-336-1166
Canada	800-225-1166
International	216-494-3781
FAX	216-494-5260
Telex CIRCLE 778 ON BEADER	9102406879

TO PLACE YOUR AD IN PC Magazine Marketplace Call (212) 503-5115 or (800) 825-4ADS

SOURCE CODE NO ROYALTIES

BOSS INTEGRATED ACCOUNTING **VERSION 2.0**

ment costs with BOSS AC-Slash development costs with BOSS AC-COUNTING, Fully integrated modules in-cluding BCL, AR, AP, PAYBOLL and INVEN-TORY, Complete PASSWORD SECURITY, MULTI USER: NETWORK compatible, BOSS is available for OutcRASCC 4 x or IBM BASCOM 2.0, Features clean well asnotated code: Easily modified. No licensing less. Air resale profiles are yours*!!!

ONLY \$995.00

Ask about our ISAM interface to QuickBASIC 4 x Vertical market applicatio

LAKESHORE

COMPUTING, INC. 05 North Front Street, Niles, MI 491; 1-800-345-4214 in MI 616-684-5120

1 CALL TODAY CIRCLE 779 ON REAGER SERVICE CARD





P.O. Box 66747 Scotts Valley, CA 95066-0747

TUR30



PROGRAMMERS TOOLS

SOURCER.

COMMENTING DISASSEMBLER

Source __creates detailed commented source code and listings from memory. COM lies or EXE files directly suitable for assembly Built in data analyzer and simulator recisions—margin data segments and provides detailed comments on interrugis and subfunctions. I Op ports and much more. Optional BIOS Pix-Processor_generates detailed commented issings for any BIOS Outstanding trender in PC Magazine 4:26.88 pg. 44.

SOURCER w BIOS Pre-Processor Shipping \$3 quesde USA \$15 CA Res add tax 1-800-662-8266

SOURCER

V COMMUNICATIONS 3031 Tisch Way, Suite 905, Dept. PC San lose, CA 95128 • (408) 296, 4224

'C' DOCUMENTATION TOOLS

of contents.
C-HDR (\$39) creates/inserts/updates headers for each procedure showing caller/called procedures.

and identifiers. C-UST (\$29) lists and actionrence of

C-LST (\$29) lists and action-diagrams, or reformats (incl. comment) asignment).
 C-REF (\$29) gives cross-reference local/global/parameter identifier syrCuALII (\$99) all 4 programs plu FREE inleggrated C-DOC program.
 30-DAY money-back guarantee.

SOFTWARE BLACKSMITHS INC. 6064 St Ives Way Mississouga, ONI, Canada LSN-4M1 [416] 856-4466 IICALL NOWII

CIRCLE 780 ON READER SERVICE CARD

California

RY \$2 99 per duki ONLY \$2 99 per diski ONLY \$2.99 per diski ONLY \$2.99 p

7 STACKJACK GAMES V1.1 (91 - 3 openced blockjock games muh-ma minega; senup CGA

7 BOS THOMAL YES (25c) - Menus driven hysologi that reaches DOS com-monds ferms etc.

3 SALAKY Y24 [11] - Eas to use word processor feetus & quick revidend command; 3 MALTEXI ESTOR Y28 [376: A pow-fur & not not sent on the held cessor & mony more sources.

T SILPOWER RUS V4 1 (No & 76) (); dos sell 4 Innecepping pring & bookseeping ongon owegees spe-chasts for small femal state & nous

One required 71 (606) A graphics of the fall of the fa

Multiple disk asto coupe as th # of dishts in a set of \$1.00 and 3.5 modes \$3.50 an \$25 data _63.50 ps to Saler Tax -6.41 = upping & Nanding _3.00 re shipped LTB ground TOTAL = \$ 0.00 and

TOTAL - Some site orders and \$2.00 more letter and \$2.00 more for Street

Persons due to thopping a Handing Persons dues to in US bods National true & check or assemble to Californie PREEWARE

1466 Springime Dr. Dept. H Palastale CA 93550

Neura M.F.S am. 4 pm. camer Service LL:50 4:00 pm or 800 date of quality software-bran orders placed before 25 pm PST each major day. Call for Decisions vib. ion major to rivage. The ad majoristics of



DECREES CHECK V2 14 (56)

W&1 (293 & 294) - (2 con ser)

PUBLIC DOMAIN

monochome

promochome

promoch

7 PLE EXPRESS V4.22 133 6 Mi - 12 des set Mehu diven dorio port gereichti many hechues the beer dollatione programs TOTAL VI.AM (\$15) Memo-7 PAROMAN
7 PARO

Great to most programs that need color (CGA)

Т рсизвя CIRCLE 782 ON READER SERVICE CARD FREE

CATALOG

64 pages!

Software, Ribbons, Labels, Books, Etc.

Toll Free - 24 Hrs.

1-800-245-BYTE

Best Bits & Bytes P.O. Box 8245-M

Van Nuys, CA 91409

FREE SHAREWARE

INTRODUCTORY OFFER 5 loaded disks for IBM

10+ latest programs

 Never before distributed · Plus our latest catalog

· No charge for software, Pay only \$5.00 s/h

 Visa/MC/Amex/Check International Software Library 511 Encinitas Blvd. Ste 104 Encinitas, CA. 92024

800 669-2669 CIRCLE 784 ON READER SERVICE CAR

SER PER DISK 75¢ This Ad 20 TOP IBM PC PD/SW DISKS (360K) ONLY \$15 + \$3 S&H

Carc. EDRAW, Aut PC-DOS Help, Baker's Dozen, Languages, EZ-Form, PC-Style, PackDisk, PC-Stock, KidCames, Best Cames, Home Inventory PC-Cutine, Form Letters, ImagePrint, SideWriter, PC-Prompt, Best Utilities.

FREE CATALOG

BRIGHT FUTURES Inc. O. Box 1030, East Windsor, CT 06088 CIRCLE 785 ON READER SERVICE CARD

3 : 1 3 3 IBM SOFTWARE CATALOG **Detailed Descriptions**

1000's of Great Programs Only \$299 per Disk Carefully Selected Fully Tested

> Includes Exclusive 2 FREE disk offer

NATIONAL SOFTWARE LABS 13376 Washington Bl. #7 Dept A Los Angeles, CA 90066

Write or Call (213) 827-7889 CIRCLE 786 ON READER SERVICE CARD

MORE BYTES FOR THE SSS

We carry only the BEST Shareware/PD programs in our library Many, many new updates/ additions! Over 700 disks FULL of useful programs, as described in our FREE 40 page (printed) catalog! As low as \$1 50/5 25" disk and \$3.50/3.5" disk! Orders shipped in 24 hrs. MC/VISA

BIG BYTE Software (was GLW Software) P.O. BOX 14008

Arlington, TX 76094-1008 (817) 265-2007 (24 hrs.)

PUBLIC DOMAIN

PEOPLE'S CHOICE

BEST VALUF

Shareware/Public-Domain Programs less than 60 cents each!!

Programs less than 60 cents each!!

Ake a close look at other companies
distributing Shareware, and you will see—
other companies advertised in this magazine either charge \$3 or
so for a diskette with one striple program, or you have to formit
A BECHEE SCHOLLE, over 2000 programs par valiable from a
collection of own 330 disks, sach disk full of programs; is listed
quantity for only \$3.75 pet diskette; with an average of over 6 programs par diskette; you pay less than 50 cents but programs. In the PEOPLE Collection includes —
"World Programs in the PEOPLE" SCHOLLE collection includes —
"World Programs in the PEOPLE" Scholle Scholle Systems
"Anneal" Scholle Systems
"Programming Languages! "Distables Systems!
"Programming Languages!" "Dis

CIRCLE 781 ON READER SERVICE CARD

People's Choice P.O. Box 171134-P 1-800-999-0471 (Nationwide catalog orderline)

1-901-763-0471

within California 1-818-764-9503 LE 783 ON READER SERVICE CARD

PUBLIC DOMAIN

FDFF PUBLIC DOMAIN & SHAREWARE CATALOG

Lowest as \$1.50 per Disk Best Quality Fast Service

Over 1000 IBM Software On 5 1/4" and 3.5" format.

SOFTSHOPPE POB 709, Ann Arbor, Mt 48105 (313) 763-8721 CIRCLE 787 ON READER SERVICE CARD

REAL ESTATE

Comtronic PROPERTY MANAGER

A NOTERLE INTANAGER
lost Advanced System Availab
Every function & resture for
Owners & Managers,
Owners Call, Resture for
Owners as Managers,
Owners Call, Resture for
Owners as Managers,
Owners as Managers,
Owners & Manage

Coentronic Systems 33305 First Way South, Suite 210 Federal Way, WA 98003 206-874-4034

leets all requirements of the

CIRCLE 788 ON READER SERVICE CARD

L-PLOT...

A Metes & Bounds program to plot/print plats of any scale. Any description- use Any measurement! Calc areas, error of closure, plots multi tracts. IBM/compat with monographics. CGA or EGA capability \$190 Or send \$15 lor real working demo, refundable with order Visa/ MC/chk Free into

LAN/SCAN, Inc. P.O. Box 6863 Abilene TX 79608 (915) 672-2901

DEED PLOTTER PLUS

Our metes & bounds software is very popular with attorneys, appraisers and gov't agencies Accepts all standard input measurements including curves. Prints user scaled mags. Reviewed by professional journals. Send for more into 14 day money back guarantee Visa/MC/ COD/CK \$99.95 + \$2.5&H Greenbrier Graphics, Inc. 1102 Main St. P.O. Box 724

Rainelle WV 25962 304-438-8157

REAL ESTATE

MANAGEMENT & ANALYSIS

"Real Property Management" \$395/\$595 for residential & commercial properties and other bkkp'g Flags deling't tenants, prints budgets, checks, invoices & 1099S. No retyping of recurring data ""Real Analyzer" \$195, when deciding buy/sell exchange or refinance 30 day money back guarantee REAL-COMP INC P.O. Boy 1210 Cupertino, CA 95015 (408) 996-1160

PROPERTY MANAGEMENT

Comprehensive program for managing residential, commercial, condos, and more. Three versions: Basic PM for owner/manager \$495 Deluxe PM for professional management-\$1,195. Multi-User with Novell network compatibility-\$2,395. Includes check writing, recurring expenses. G/L. management reporting. YARDI SYSTEMS INC 813 Reddick St

Santa Barbara, CA 93103 805-966-3666

PROPERTY MANAGEMENT

Rental-Ease. New state of the art property management software. Extremely fast and easy to use Everything is included, tenant tracking. repairs and maintenance, income and expense, check writing. No extra modules to buy The ultimate in property management \$695 complete Free brochure, Demo \$10 STRATEGIC OFFICE SYSTEMS 9129 Mallard Circle Sandy UT 84093 800-942-6784 or 801-942-6784

PROPERTY MANAGEMENT

Since 1978 over 6.500 users of our software have tound it comprehensive, flexible and easy to use. We offer systems to manage the follow ing types of properties: COMMERCIAL/ BESIDENTIAL/CONDOMINIUM/ HOMEOWNERS ASSOC/MINI-STORAGE FA-CHITIES For more into and sample printouts call:

REALTY AUTOMATION 11365 Fast Shore Drive Hauden Lake ID 83835 (208) 772-3259

RELIGION

PARISH DATA SYSTEM"

Comprehensive census/contribution program. Easy to operate, menu driven. Family, member, financial into & reports tully integrated. Seleclive lists, labels, contribution/fultion statements, personalized letters. User can create own reports, letters. Other church programs available Over 2600 users. Free info Parish Data Systems, Inc. 3031 W Northern Ave. Suite 121 Phoenix AZ 85051 (602) 247-3341

RELIGION

CHURCH SOFTWARE

on churches choose DowerChurch Disest for their membership, contributions & accounting near recharter Plate to their membership, commounting a accounting needs hare package. Discover why the best value package is also the top per former & the recest to use. Call today for your FREE full-working DEMO version.

F1 Software, P.O. Box 3096, Beverly Hills, CA 90212 (213) 854-0865 CIRCLE 789 ON READER SERVICE CARD

Quick, Complete and Easy 3 reasons why Bible Quest is rated the best software for Bible study

Bible Ouest

- · search by word(s), phrase or reference
- Expand your knowledge your request is located
- instantly in full context Answers you've always wanted
- · works with most word processors A unique learning tool requires 640K, 2.1 MB Hard Disk, and DOS 2.1 or later Unlock the potential of the
 - Bible in your life

Bible Quest (King James Version)

An InfoOuest Product Call 800-336-6644 Free color brochure

Order your own copy \$99 + \$5 handling and shipping (Visa, MasterCard or American Express accepted) CIRCLE 790 ON READER SERVICE CARD

ENAS COMPUTER BIBLE™ New American Standard The best of the best sellers

- For IBM and 100% Compatible Instantly searches text for any word or phrase.
 Allows verses to be saved for
- use with word processors.

 Also includes windowing capability.

Mail check or money order to Foundation Press Publication	٤
	15
P.O. Box 6439	
Anaheim, CA 921	ł
(714) 630-6450	
\$129.95 (CA orders add 6% tax	e)
nhus \$4 00 shirming & handlin	

CIRCLE 791 ON READER SERVICE CARC

SCRIPTURE SCANNER BIBLE ON DISKS

- · Search the Bible in seconds for key words or phrases.
- Print any list or portion.
 Write sermons, lessons, etc. from your word processor or ours with access to scripture. Special: \$99.95 & up

CALL: 512-255-9569

S O F T W A R E Box 355, Round Rock, TX 78680 CIRCLE 702 ON DEADER SERVICE CARD

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as nossible.

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct-Response/ Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 700,000 brand specifiers who read PC Magazine ... YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115 or (800) 825-4ADS

SALES MARKETING

SaleMakeř Plus

Sales and Marketing Software System

- All New Version 2.0 now shippi
- Hundreds of powerful NEW features User-customizable for any business
- Inbound & outbound telemarketin Direct marketing, Full Mail Merge
- Search ALL fields for target marketing Unlimited Notes and Contacts Schedules calls and call-backs
- Autodials your phone
 Contact history, Management reports
- Laser Printer Interface
- Instant follow-up letters & labels Pop-up windows, full color screens
- Unlimited file capacity with no loss in speed Imports & exports ASCII files 97+ data fields plus unlimited windows
- le-user & true LAN versions available
- Module for unattended remote data transfer Box 531650 Grand Prairie TX 75053

SaleMaker's new Plus version is packed with new features that make it state of the art

software for sales and marketing. Marketing is everyone's ness and SaleMaker Plus should be everyone's choice for marketing sof

ried 1967, Award for Technical B sazina Editor's Choice, 12/22/87

Call for FREE literature on this exciting NEW software 1-800-433-5355

(214) 264-2626 in Texas SaleMaker Software

CIRCLE 793 ON READER SERVICE CARD

SCIENTIFIC

TURN YOUR PC INTO A WEATHER STATION . . . IN MINUTES!

Add PC Weather to your IBM PC, XT, AT or compatible and your computer will keep a constant and watchind you on local weather and the property of the property

Only \$249.00 To order, please calt: 1-800-247-5712°

TMI, Inc.

Kruse Way PL, 2-120, Lake Oswego, OR 97035 *For Info. & In Oregon, call 503-635-3966

 MADE IN U.S.A. VISA, M.C. AND AMEX CIRCLE 794 ON READER SERVICE CARD

The PCW gives

SECURITY

The PC Protector Password \$99



NASDEC

2704 - 85 Garry St. Vinnipeg, M8 Canada R3C 4J5 Winr LE 795 ON READER SERVICE CARD

VIRUS-PRO

al RG-2 Rain Collec

Professional virus protection for fBM-compatible MS-DOS PCs. Tracks EXE, SYS, COM, BAT & hidden files on all logical drives. Keens complete software configuration records. Find existing infections quickly and reliably! Use printout to guide recovery. Safe and easy to use. Nonintrusive, Valuable User Manual.

\$49.95 + \$3 S. & H.

Int'l Security Tech., Inc. 515 Madison Ave., NY. NY 10022 (212) 288-3101 CIRCLE 796 ON READER SERVICE CARD

SECURITY

With our Copy Protection Products. They really work and do not burden the honest user...

For Hardware Based Security (Parallel Port/ROM Socket Interface)

- STANDARD KEY TAG Unlimited executions
 • COUPON KEY TAG
- Limited executions

 DURATION KEY TAG Limited (days, hours, min.)



For Disk Security High Level Security

- PADLOCK II DISK
 SAFEGUARD DISKS
 COUPON DISKS
- For Hard Disk Protection

 HDCOPY

Low Level Security PC-PADLOCK

The market is filled with copy protection products which burden the user or aimply don't work. We have over 3500 satisfied software firms utilizing our systems. The high-level fingerprint has not required an undate in over 3 years.

Why should your valuable data or useful software program become available in the Public Domain? Call or write for

nore information GLENCO



ENGINEERING INC Arlington Hts II 60005 FAX 364-7696 Felex 493-7109

CIRCLE 797 ON READER SERVICE CARD

he world's leading software manufacturers depend on Softquard copy protection systems. Your FREE DISKETTE introduces you to SuperLock - invisible copy protection for IBM-PC (and compatibles) and Macintosh.

- Hord disk support No source code change
- Customized versions
- LAN support New upgrodes ovoilable

(408) 773-9680 SOFTGUARD SYSTEMS INC. 710 Lakeway, Suite 200

unnyvale, California 94086 FAX (408) 773-1405 CIRCLE 798 ON READER SERVICE CARD

ftguard



compatibility & strength It features

- no need for damaged media or I/O plugs thwarts all Bit-copy Software
- supports all Hard & Boppy Disk formats restrict or allow Network Installs allows protected upgrades by modern BBS
- limit program use by Oate or #Executes · remotely reset installs or Expiration
- \$195 Starter Kit or \$495 with NO meter counts. Free info & demo disk available. Az-Tech Software, Inc.

305 Fast Franklin Richmond, MO 64085 (800) 227-0644 (816) 776-2700 CIRCLE 799 ON READER SERVICE CARD

SOFTWARE COPY PROTECTION . Instalis easily on your IBM-PC software

- · Deleals all disk copy software. · Supports all Hard & Floppy disk formats
- Requires NO special devices or disks. · Invisible to your end user

Eval disk protects two programs of yours \$25 Starter kil & No meter count packages \$99 + L-Tech Corporation 377 Route 17 South, Suite 618

Hasbrouck Heights, NJ 07604 (201) 288-1608 (BBS 8/N/1): (201) 288-8795

FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

SECURITY

STATISTICS

HANGS OFF THE PROGRAM® PC SECURITY

HANDS OFF THE PROGRAM provides a sophisticated technique to separate up to 64 users of a PC, by privilege, into their own separate areas on the hand disk. Users may access only their own areas and any other area protected with a lower

HANDS OFF THE PROGRAM protects files on your hard disk by prevening unauthorized users from modifying the DOS file attributes (Read Only, Hidden, System). For example, use the READ

HANDS OFF THE PROGRAM restricts access to your hard disk wis "disk locking" A "locked" hard disk may not be boosed, accessed by applications software or formatted via the DOS FORMAT com-

man or formated via the DDS FORMAT com-model of the "unfocked" in the Common of the Common of the "unfocked" in the Common of t

box d Only and Execute Only privileges by

Price \$89.95 add 3.75—shipping Check Money Order, VISA, MC acci

Systems Consulting Inc. 412-963-1624 Box 111209. Pittsburgh, PA 15238-0609 CIRCLE 800 ON READER SERVICE CARD

RATS Version 3.00!!! RATS is an integrated environment for data analysis, forecasting and graphics. Forecast with Box-Jenkins (ARIMA), exponential smoothing, vector autoregressions, large models and others. Choose from a wide variety of techniques to analyze your data, from stepwise regression to logit and probit, from two-stage least squares to spectral analysis. Generate

reports using the excellent graphics and data-handling capabilities. Our newest release (3.00) is more interactive than ever, with full help at the touch of <F1>. The power of RATS, in a new, improved form, is still yours

VAR Econometrics P.O. Box 1818 Evanston, IL 60204

(800) 822-8038 / (312) 864-8772

CIDCLE BOX ON DEADED SERVICE CARD

THE BASS SYSTEM™

for only\$300!! Call or write for more information today.

OATA WTSTUDY:
INFILE WTSHTS;
LENGTH SEX S 1;
INPUT AGE 1-8 @ 10 SEX S

\$ 20 HEIGHT WEIGHT 30-37;
FORMAT AGE 5.0 HEIGHT WEIGHT 6.8; PROC GLM OATA-WTSTUOY; CLASS SEX; MODEL WEIGHT - HEIGHT AGE SEX!

The BASS SYSTEM (our product) took 25 seconds, 384K, and 1.2 Meg of disk space, it costs \$399 one time, with occasional updates at \$35. Dataset was 1 000 observations BASS INSTITUTE, INC. P.O. BOX 349 CHAPEL HILL, NC 27514 (919) 933-7096

CIRCLE 803 ON READER SERVICE CARD

High performance STATISTICAL SYSTEM

PC Security Products Hardware/Software

LogSafe Access Protection WorkSafe Back-up Protection ComSafe Modem Protection CodeSafe H/W Copy Protection ViruSafe Virus Protection DataSafe Data Protection DemoSafe Demo Protection

Gamma Security Products 10 Wilshire Blvd., #609, Santa Monica, California 90401 Tel: 213/394-8622 FAX: 213/395-4214 TIx: 51060082"3 Brochures & Demos Available

CIRCLE 801 ON READER SERVICE CARD

BIT-LOCK* SECURITY

Piracy SURVIVAL 5 YEARS proves effectiveness of powerful multilayered security. Rapid decrypfion algorithms. Reliable security device transparent to PARALLEL or SERIAL port. Compli mented by low cost KEY-LOCK " multiteatured COMPU-LOCK" including countdown, firmeout, data encoding & multi-product protection MICROCOMPLITER APPLICATIONS 3167 F. Otero Circle

Littleton CO 80122 (303) 922-6410 or 770-1863 Overseas offices StatSoft of Europe (Hamburg FRG) ph 040/4200347 StatSoft UK (London UK) ph 07072 71166 Hearne Software (Melbourne Australia) ph 613-497-4276 CIRCLE 804 ON READER SERVICE CARD

NEW StatPac Gold

The Right Choice

For Statistics

· Easy to learn

Simple to use Fast, accurate, versatile
 Windows and graphics

And Forecasting

Call now for a free brock 1-800-328-4907

WALONICK ASSOCIATES

CLE NOS ON READEN SERVICE CA

tion of descriptive, interential, and exploratory statistics with forecasting. STATS+ features intelligent. two-way interfaces to data from Lotus. Symphony, dBill+, and other programs. For more into look for our ads in most computer journals, ask your dealer, or contact StatSoft. Price \$245 (+35 ship/handl).

A powerful, elegant, and super-fast statistical package integrated with complete data management and dynamic graphs. Comprehensive selection of descriptive, inferential, and exploratory statistics with forecasting.

2325 E. 13th St., Tulsa, OK 74104

(918) 583-4149

GO with SOLO

ideal for researchers and business professionals. SOLO provides all the necessary stat procedures. Incredibly easy to use. Inexpensive enough for a single project or occasional use. \$149 complete with graphics. Call today. MC or VISA Satisfaction guaranteed!

BMDP STATISTICAL SOFTWARE 1440 Sepulveda Boulevard Los Angeles, CA 90025 (213) 479-7799 CIRCLE 806 ON READER SERVICE CARO

NCSS plus-\$99

Easy-to-use menus & spread sheet Multiple regression. T-tests. ANOVA (up to 10 factors, rep. measures, covariance) Forecasting Factor, cluster, & discriminant analysis. Nonparametrics Cross Tabulation Plots histograms box scatter. stemleaf Sort Subset Transformations Reads ASCII New graphics Pkg \$59 NCSS

865 East 400 North Kaysville, UT 84037 Phone 801-546-0445

STAT PLAN III

Easiest to use statistics program available Complete range of statistics-curve fitting crosslabs, correlation, multiple regression, T-tests, etc. Graphics with printer/plotter output Capable of handing over 50,000 data points, interfaced directly with lotus files. Demo diskette available MC-VISA Only \$179 THE FUTURES GROUP-STAT PLAN III

76 Eastern Blvd . Dept C Glastonbury, CT 06033-1264 (203) 633-3501

STATISTIX - ONLY \$169!

STATISTIX is a powerful and very easy to-use statistical system for PC's Used by many universities, businesses, fed and state govern ments and research organizations. Check us out before you buy a statistics program: you'll agree SX is a "hest buy"! Money Back GUAR-ANTFED For more info:

NH ANALYTICAL SOFTWARE PO BOX 13204 Roseville, MN 55113 (612) 631-2852

SURVEYS

THE SURVEY SYSTEM

An easy to use menu driven system for the entry, editing, processing and presentation of questionnaire data. The system can produce camera ready crosstabs and other tables in banner format. Also statistics and bar charts. Benression and open-end coding/analysis opfinns available

CREATIVE RESEARCH SYSTEMS 15 Lone Oak Ctr. Dept. P. Petaluma, CA 94952 (707) 765-1001

A-CROSS - #1 IN CROSSTABS

Easiest & most powerful crosstab program for survey & research data 16 8mill cases 9.999 vars-case Read any ASCII, col binary, dBASE file Professional tables to all printers | laseroutpuls to ascii & lotus wks tiles. Full stats. 1 Itest, chi-sq. Nominated for PC Mag. Award for Tech Excellence

STRAWBERRY SOFTWARE INC. 42 Pleasant Street-FREE DEMO DISK Waterfrown Massachusetts 02172 (800) 4-ACROSS FAX: (617) 926 0134

MARKETPLACE

TAXES

AM-TAX

If you have a PC, this is the way you should be preparing your 1988 income tax return. Fast, easy, & accurate. No spreadsheet software reqd. Thousands of satisfied users.

Regular Version: Supports 18 schedules and

forms (1040, A-SE, 2106, 2119, 2210, 2441, 3903, 4136, 4562, 6251, and 8615).

Prints IRS-approved forms and schedules, plus a graphic 1040 on Epson or IBM-type dot printers. Works with overlays and pin-fed forms. Requires IBM-comp. 256K.

Only \$45

NEW Advanced Version: All of the regular features plus more forms (1040ES, 3800, 4137, 4255, 4684, 8582), and laser printed 1040 w/graphics on HP-type lasers. Req. 384K and two drives.

Only \$60

State programs for CA, NY, NJ, MD, MO, and VA. Data auto transferred from federal tax forms. \$30 each.

MC/Visa. 30-day guarantee.

AM SOFTWARE
P.O. Box 25010
Kansas City, MO 64119
(816) 241-0014
CIRCLE 107 OH READER SERVICE GAS

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct-Response/ Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 700,000 brand specifiers who read PC Magazine ... YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115 or (800) 825-4ADS

UTILITIES

Fix common problems fast!

You don't need to be an expert to diagnose and correct problems involving PC selbu, All you need in HELPME" software! More than 900 tests. Oulck identification of system configuration and compatibility, 399. SHI. MCVISS. Californis Software Products, Inc., 525 N. Cabrillo Park Drive, Santa Ana, CA 92701, (714) 973-0440.

BREAK 640K

Why buy expensive boards? VRAM.** gives your PC/X1/AI or PS/2 8 megabytes of memory by turning disk space into expanded memory! Use extended memory for expanded memory! Create VERY LARGE worksheets FAST Automatic Easy to use 640k not required Money back guarantee \$49 + \$3 s/h
BIOLOGIC

11982 Coverstone Cir., Suite 1622 Manassas, VA 22110 (703) 368-2949 (lax 703-361-8251)

DOS DREAMS COME TRUE!

508-456-3699

STILL RIVER SHELL a new ver2 58 powerful "Prolei and Shout DOS enhancement utility for filter disk mgmt and DOS command interface Listed 1997 8 1998 PC SIGS 1070 100 programs 539 compiete with 166 pp manual Limits site (is 330 POLCIOL 9-8 MCVISA no fee 90 day No-Flisk Guarantee BIII White-SR Shell 190 Box 55 MG SIGS 190 POLCIOL 9-8 MCVISA SIBII White-SR Shell 190 Box 55 MG SIGS 190 POLCIOL 9-8 MG VISA SIBII White-SR Shell SIBII SIBII Shell SIBII Shell

Announc

Announcing A Menu System So Appetizing, You'll Want To Take 30,000 Bytes.



Take one look at the Automenu Software Management System, and you'll agree that there's no better entree into the world of computer software. Automenu increase computer productivity by eliminating the need for complicated DOS call 1-800-662-4330. Or visit the dealer nearest you.

MAGEE ENTERPRISES, INC. 404-446-6611/CompuServe 70167, 2200 FAX 404-368-0719/BBS 404-446-6650

Automenu

The First Menu System, And Still The Best.

CIRCLE 810 DN READER SERVICE CARD

D*I*R*E*C*T A*C*C*E*S*S

Direct Access to All Your Software

▲ Organize all your programs on hard disk with user-defined menu system ▲ Access any program or command with a single keystroke

▲ No need to learn complex DOS commands

▲ Usage tracking provides reports on all software usage.

▲ Customize passwords for security of any sub-

menu or application

A Toll-free technical support

A PC Magazine "Editor's Choice" program.

SUGGESTED SO 095 Plus Shipping

SUGGESTED \$895 Plus Shipping & Handling CALL 1-800-242-6368 FOR THE DEALER NEAREST YOU.



1621 WESTGATE ROAD EAU CLAIRE, WI 54703

SUPER PC-KWIK

The industry's best disk cache "Highly recommender" I Dvorak " hold on to your ear drums because you've just launched " J Dickinson." . the word swoosh! may give you an idea " J Seymour You can't buy more performance tor just \$79.95 \$2 S/H VISA/MC + \$2.50 if (CA).

Multisott Corporation 15100 SW Koll Parkway #L Beaverton, OR 97006 503-644-5644 or 800-234-KWIK

Send dBASE into warp speed with dBOOST automatically!

(FSF) utility hast automatically boosts the speed of IdASE II, II dASE II II PLUS, and dBASE IV, as were in an dBASE application using Clippa F, as well as the Control using Clippa F, as well as the dBCOST makes dBASE a neal speed dBCOST makes the CoST input output dBCOST makes the CoST input dBCOST makes the CoST input

/S residents add sales tax.

ISOGON CORPORATION
330 Seventh Avenue
New York, NY 10001



(800) 662-6036

CIRCLE 812 ON READER SERVICE CARD

Run Novell Without Keycard Protect Novell Network From Keyboard Failure

Netsafe 2.0 - 2.11 \$99 US

Other products for P-Cad, Cadkey, Cadvance

, Cadkey, Cadvance Nasdec (MB) Inc. 2704 - 85 Garry Street Winnipeg, MB CANADA R3C 4J5

Fax (204) 943-3702

CIRCLE 813 ON READER SERVICE CAP

FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

UTILITIES

RUNNING OUT OF MEMORY?

LIM EMS 4.0 for PC/XT/AT

- No expensive memory boards required-uses memory that goes unused on most systems
- Works with 1-2-3, Symphony, DOS 4.0, Windows, and many others PC/XT/286 AT and Special High Speed 386 AT versions all for one low price \$59.95
- OEM pricing also available

BIOSys Software

1501 N Broadway, S Walnut Creek CA 94596 (415) 933-7713 CIRCLE 814 ON READER SERVICE CARD

SOFTWARE SIMPLE TO USE! 39.8

lehdar Minitext Simple word processor for everybody

lehdar Calculator 29.%

Replace your desktop calculator! For PC/XT/AT/386/PS2 and cor

To Order Cell: USA 1-800-663-6521 CANADA (604) 879-5445 Add \$4.00 Ship & Handling.

Dealer & Dist. Please call (604) 879-5445

14 E. Broadway, 314 E. Holly #106
Vancouver, B.C. Bellingham,
Systems Corp. VST 1V4 WA. 98225
Vise, M/C or Money Order CIRCLE A15 ON READER SERVICE CARD

Ammunition to conquer your biggest problems!



- The Virtual Expanded Memory Mane provides your EMS applications with up eight megabytes of expanded memory
- It turns PC/AT or PS/2 ex-tended memory into expanded tended m memory
- It turns hard disk storage into expanded memory.
- It's compatible with most EMS applications, including 1-2-3 and Symphony Only \$89.95. 30-day money-back guara

CHOKE Fort's Software P O Box 396 Manhattan, KS 66502 (913) 537-2897

CIRCLE A18 ON READER SERVICE CARD

AT'S DON'T NEED **360KB DRIVES**

Allows copying of IBM AT files for use on IBM PCs, XTs, and compatibles with no hardware or software modifications. A 360K floppy drive is not required. "CPYAT2PC" may reside on your IBM AT hard disk and copies 1 file or entire subdirectories in 1 step. Price \$79. + \$4.4.

MICROBRIDGE COMPUTERS INTERNATIONAL, INC. 655 Sky Way - Suite 125 San Carlos, CA 94070 1-800-523-8777 (CA) 415-593-8777



WORD PROCESSING

CompareRite™

"Outstanding software - the best of its kind...CompareRite compares documents in ways that I didn't think were possible. It's utterly amazing."

- John Dvorak, PC Magazine, 3/15/88

CompareRite saves hours of editing by showing you how any two documents differ. Amazingly fast, CompareRite will create a complete comparison draft, ready for printing, or display the shows changes in many user-selectable formats, and is compatible with all major word processing programs.

CompareRite is perfect for attorneys, editors, proofreaders or anyone who has to make or compare drafts. Thousands in use. Price - \$129.95 + \$5 shipping/handling

JURISOFT

763 Massachusetts Avenue Cambridge, MA 02139

(Outside MA) 800-262-5656 Ext. 10 (In MA) 617-864-6151 Ext. 10 CIRCLE BIR ON BEADER SERVICE CARD

MISCELLANEOUS/ACCESSORIES



CompuTogs Dust Covers The ultimate in dust protection. Available in natural

canvas/brown trim or new designer gray/black trim (add \$2/cover). Our covers are far superior to viny!! COMPARE OUR PRICES! MONITOR 15.95 PRINTER (specify) 15.95
COMPARE OUR PRICES! KEYBOARD 13.95 MON CPU 24.95

CompuTogs* P.O. Box 19728, Greensboro, N.C. 27419 • (919) 292-9060 **CUSTOM EM** ROIDERY

CIRCLE 820 ON READER SERVICE CARD 1-800-227-TOGS



Dealer Inquiries In

CIRCLE 821 ON READER SERVICE CARE

COVER YOUR INVESTMENT DUST COVERS - Our 4 cot designs in five coto State if nee and Durates Ryton Clear Plastic - Coth backed whyle

ORDER DESK (800) 874-6391

FAA (904) 81 CIRCLE 822 ON READER SERVICE CARD

CALL FOR FREE CATALOG

COMPUCOVER'

** Keyboard Protectors 24 Hear Protector from dust and spills Claim to the eye and Soft to the touch. Over 200 models assisted

WORD PROCESSING

NEW! PC-WRITE 3.0 Full featured word processor for PC's. Edits

targe files and columns. Spell check, mail meroe. ASCII and macros. Easy to use Supports 500 printers. Software guide, and tutorial on diskettes \$16 Registration with manual lele support, newsletters and updates: \$89.00 90 day moneyback quarantee DIHCKSOFT

219 First Ave North #224 PMAC Seattle, WA 98109

1-800-888-8088 (206) 282-0452 Visa/MC

World's Bilingual Word DuangJan, bilingual word processor for En-

glish and: Armenlan, Bengali, Euro/Latin, Greek, Hindi, Khmer, Lao, Punjabi, Russian, Sinhales Tamit, Thai, Viet \$109 + \$5 s/h (toreion + \$12 s/h) Font editor included For IRM compatible with dot matrix & Laser let printer. Demo \$6 + \$1 s/h.

MegaChomp Company 3524 Cottman Avenue

Philadelphia, PA 19149-1606 USA 215,331,2748

XvMouse .. XyWrite!

Mouse... the lightning-fast enhancement - makes XyWrite III Plus even better! Accelerates both beginning and advanced XyWrite users!

XyMouse... enables you to use powerful XyWrile commands without reading manuals or memorization XyMouse... moves cursor smoothly, and instantly selects from diszens all commands.

with easy-to-use mouse includes hard disk directory CALL NOW for this fontastic timesov GALACTIC SOFTWARE Inc. 2600 Phirmoni Avenue. Suite 211 Hushingdon Volley, PA 19006 215-947-0930

CLE A1A ON READER SERVICE CARE

PC Magazine Marketplace

2nd Color Option Available

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct-Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery. If you think that your business can benefit from the 700,000 brand specifiers who

read PC Magazine ... YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115 or (800) 825-4ADS



ACCESSORIES



uters, Keyboards, Printers & Lasers Models, Superior Quality, Best Prior **NFW!** ViziFlex-Seels



BAR CODING



PERCON® E-Z-READER

FAST . ACCURATE . RUGGED NO SOFTWARE CHANGES with PC/ NO SUPTUMNE CHANGES WITH PC/ XTIAT and PSI2, AT&T 6300, Wyse 30(60)BS/PC/AT, Kimtron KT-7/PC, Link PCTerm/MC1/MC3, TeleVideo PCS1/ 905/955 & DEC VT220 keyboards, multi-user RS-232 interfaces

- Immediate shipment Free phone support

Details or Questions? Call us. (503) 344-1189

Professional Labeling Software

- Memory-resident software prints bar codes, large text, boxes & lines directly from any program: dBASE, BASIC, etc.
- · Works with Dot Matrix or Laser printers · Any label format or size: AIAG etc.
- Includes easy-to-use menu-driven label \$295 complete

Call or write for FREE sample printout and brochure

Image Computer Systems ellington Hts. Rd., Avon CT 06001 (203) 678-877.1

BAR CODE EXPRESS



- Industry's Largest Selection
 - Many Unique, Useful Features
 - Direct from Manufacturer
 - 30 Day SS Back Guarantee
- Same Day Shipping

Labeling Software

- . Print Big Text (Up to 2") & Bar Codes on PC and Compatibles . On Dot Matrix (Epson, Oki, IBM) and LaserJet Printers
- Any Size—Flexible Format—FAST
- "Callable"—\$239 or Menu-Driven—\$279

Handheld Portables

- · Simple, Powerful, 64K Memory Easily Programmable Prompts
- Uploads via RS-232 or Keyboard
- Bar Code and Keyed Input
- Doubles as Non-portable Reader Complete with Wand—\$849



Bar Code Readers for PC XT, AT & PS/2 and all RS-232 Terminals

- Attaches as 2nd Keyboard
- No Software Changes Reads 2of5, UPC, 128, Code 39
- · Rugged, Stainless Steel Wand or Laser Complete with Wand—\$399

DATA SOLUTIONS 417-A Ingalis Street Santa Cruz, CA 95060

800-345-4220 CA 408-458-9938

Make your mark in automatic identification with ISD software solutions, Print all kinds of bar code labels on demand. Speed and simplify data collection. Track products dock-to-stock. And streamline inventory control

Integrated Software Design, Inc., 171 Forbes Blvd., Mansfield, MA 02048 Call (508) 339-4928 and ask to scan our catalog.

CIRCLE 824 ON READER SERVICE CARD



BAR CODING

0 200 **Bar Code Solutions**

ON-LINE BAR CODE READER NETWORK

NEW PC-WAND 300 - up to 128 reader data collection system • Auto-discriminates • Collects, formats and transmits to PC or host PC-WAND 800 WanderWand - pro-

- grammable portable har code readers PC-WAND 200 - terminal wedge on a serial "party line" for mini's
- PC-WAND IOO emulates 2nd keyboard NEW - bar code printing software
- packages for your printer DEALER INQUIRIES INVITED

INTERNATIONAL TECHNOLOGIES & SYSTEMS CORP. PHONE: 714 990-1880 FAX 714 990-2503 CIRCLE 82S ON READER SERVICE CAN

BAR CODE PRINTING SOFTWARE Print Code 39, 2 of 5, UPC, and EAN bar codes directly from your own applications without copying data to special print files. IBM PC/XT/AT/PS2 and compatibles. Supports IBM Graphics, Epson and LaserJet printers and compatibles

PrintBar II Program \$295.00 PrintBar II Demo \$25.00 Other Bar Code products available for non-MS-DOS environments

Bar Code readers from \$395.00 FREE Brochure (916) 622-4640 FAX 916-622-4775

Bear Rock

6069 Enterprise Dr., Placerville, CA 95667 IRCLE 426 ON READER SERVICE CARD

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .



FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

BAR CODE READERS

NO SOFTWARE CHANGES REQUIRED

- IBM PC/XT/AT PS/2 CLONES
 TANDY 1000SX/1200/3000/400
 ZENITH 138/148/151/158/248
 EPSON EQUITY I & III

TERMINALS:

- WYSE 50/60/75
 KIMTRON KT-7/PC
 CDNTRON LT-7/PC
 CDNTRON LT-7/PC
 TANDY DT 100
 RS-232

PC/MS DOS BAR CODE PRINTING SOFTWARE

RESELLER DISCOUNTS AVAILABLE

AMERICAN MICROSYSTEMS 1110 S. AIRPORT CIRCLE, SUITE 14 EULESS, TX 76040 (817) 571-9015 (800) 648-4452 FAX (817) 685-6232



- Bar Code Reader
- Model PC-WEDGE Render No software changes necessary For PC/XT/AT or compatible Reads Code 39, 2 of 5, UPC, Codab EZBarcode I printing software incls

- EZSECOGE I printing Program
 [cordered separately].
 First can be a first cord separately.
 For dot matrix and Laser let printers
 Vary bar code height, spacing, etc.

 EZBarcede II Printing Program... \$99.00
 Keyboard or text file data input
 Prints Code 39. Interleaved 2 of 5. UPC-A.
- dBARCODETM Program prints bar codes from within dBASE III Plus \$99.00

TimeKeeping Systems, Inc. 12434 A Cedar Road • Cleveland, OH 44106 (216) 229-2579 • Fax: (216) 229-2573

BAR CODE & MAGNETIC STRIPE

for the IBM PC & PS/2
Simple & quick installation
No additional software or port
Metal wand & case

Also available:
Bar code printing software
Magnetic stripe encoders
of or other computers & tem
GSA pricing available

TPS ELECTRONICS 4047 Transport Street Palo Alto, CA 94303 Telephone: 415-856-6833
Telex: (Graphnet) 371-9097 TPS PLA
FAX: 415-856-3843
CIRCLE 827 ON READER SERVICE CARD

BOOKS CATALOGUES PUBLICATIONS

PCir

Expansion Products

Possibly the largest selection of PCjr products in the country. We don't just sell

- PCjr products, we design them. Speed Up Products
 - •I'would DMA Cannida Second Floppy Disk Drives •312 Disk Drives
- •PC_Ir Optical Mice Monitor Adapters for PC's
 Parallel Printer Ports
- Full Size Keyboard: *Speech Attachmen
- Jonaticks, Cables, & Adaptors Call or write to receive our free 32-page catalog of PCjr Add-On products. For even faster results, circle our reader service number.

PC Enterprises "The irProducts Group" Box 292, Belmar, NJ 07719 (201) 280-0025 (800) 922-PC-JR ICLE 828 ON READER SERVICE CARD

IBM PCjr SPECIALS Full line of IBM PCjr Hardware

- * Memory Expansions to 640k Second Floppy Drives
- * Parallel Printer Ports * Full Size Keyboards
- * Modems, Int. & External Joysticks, Serial Cables
- · PCjr Network cards
- . BASIC Cartridges, Mice
- PCir Tested Shareware
- Complete Computers · Repair Service
- Send for Catalog Today COMPUTER RESET Attn. Dept. PCM

P.O. Box 461782, Garland Texas 75046 (214) 276-8072 CIRCLE \$29 ON REAGER SERVICE CARD

ALL BOOKS --- 10% OFF --- PLUS

Order by modern or voice OUR GIANT BOOKSTORE stocks 15,000 litles. Computers Business Fiction Non-fiction.

All discounted! PLUS EVEN DEEPER DISCOUNTS on PC hardware, software, supplies Including Design-Your-Own computers And Lease-to-Own

DISCOUNT STORES Modern (800) 666-5080 Voice (800) 833-0720

PC Magazine Marketplace 2nd Color

Option Available

COMPUTER INSURANCE



1-800-822-0901 CLE 830 ON READER SERVICE CARC



SAFEWARE INSURES YOUR COMPUTERS

Full replacement of hardware, media. purchased software. As low as \$39 yearly. Covers fire, theft, power surges, other accidents. Blanket coverage; no list of equipment needed. Call for information or immediate coverage

1-800-848-3469

Local (614) 262-0559 SAFEWARE. The Insurance Agency Inc. 2929 N. High Street, P.O. Box 02211 Columbus, OH 43202

CIRCLE 831 ON READER SERVICE CARD

DATA CONVERSION

DATA

CONVERSION

- DISK . TAPE - DISK OPTICAL SCANNING WORD PROCESSORS

SPREADSHEETS DATA BASES, MAIL LISTS OVER 2,500 FORMATS

IBM PS/2 WORDPERFECT LOTUS DRASE



(212) 463-7511 NATIONAL DATA

CONVERSION INSTITUTE MERICA'S LEADERS IN DATA CONVER

DATA CONVERSION

9-TRACK TAPE

CHECK OUR FEATURES CHECK OUR PRICES

We Support IBM PC/XT/AT. PS2. Mac and Sun

- Unix, Xenix, DOS Drivers 800/1600/3200/6250 BPI
- Tape Duplication Linkable Modules
- Easy and Fast Conversion Disk Backup/Restore
- Unlimited Block Size 256 K or 1 M Ram on
- Board Best Prices - Call Today

415-324-9114

MicroTech Conversion

Systems 525 Alma Street, Palo Alto. CA 94301 Quality Conversion Products Since 1980

CALL FOR OUR FREE BROCHURI DATA



CONVERSION LABORATORY

America's Largest Doto Conversion and Optical Scanning Facility 184-13 Horace Hard. Exp., Fresh Meadows, NY 11345

運 (718) 357-8700 · LE 834 ON REAGER SERVICE CARD

BUSINESS PROJECT MGMT.

PROJECT SCHEDULING IN 1-2-3 AND SYMPHONY

IN 1-2-3 AND SYMPHONY
PROJECT CALC 'adds in' new menu choices to create projects on your with the control of th

cory work nours, vacations and days on a grephic calendar Works i CGA, EGA, VGA, Hercutes \$179.95 FRONTLINE \$YSTEMS, INC. 7406.PC, San Francisco, CA 94120 0) 451-0303 x55, (916) 677-7171 x55

CIRCLE 850 ON READER SERVICE CARD



THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

DATA RECOVERY SERVICES

ONTRACK 800-752-1333 DATA RECOVERY INC. In MN Call 612-937-1107

The Only Custom Data Recovery Experts

A service from the

Call us when:

creators of Disk Manager! Your hard disk can't be booted Recommended by major drive manufacturers.

You can't access a file

· Your directories and/or FATs are scrambled or gone, etc.

For that critical moment when only the best will do.

DISK CONVERSION

TAPE/DISK o CONVERSIONS 4

Conversion services to or from over 1250 computer systems:

- Magtapes Mini Computers Micro Computers
 Typesetters
- Word Processors CALL THE INDUSTRY LEADERS

PIVAR

COMPUTER SERVICES, Inc.

(312) 459-6010 165 Arlington Heights Rd #M Buffalo Grove, IL 60089 CIRCLE 837 ON READER SERVICE CARD

DISK/TAPE/OPTICAL SCANNING

- · 33¢ per page typewritten text to disk in ASCII. 50¢ per page all WP formats · Scan Typeset text 6 to 24pt low rates Disk convert from IBM, WANG. XERDX.
- VYDEC + 1000 others customized Tape conversions (800, 1600, 3200, 6250 BPf) BEST RATES • FREE TEST
- 1st RUN COMPUTER SERVICES 1261 Broadway Suite 508 New York, NY, 10001 (212) 779-0800

TOTAL SERVICE CONVERSIONS . OUR NAME SAYS IT ALL .

- · Quality Service · Ouick Turnaround
- Low Prices 1.800.5.CONVRT ●
- In CA 1-213-669-8134 ●
- Formerly W:Text Sciences Corporation TOTAL SERVICE CONVERSIONS INC.

1933 North Monon Street Los Angeles, CA 90027

DISKETTE COPY SERVICE

TAPE-TO-FLOPPY FLOPPY-TO-TAPE TAPE DUPLICATION FLOPPY-TO-MICROFICHE LASER PRINTING

1-800-422-9622 IIn OK: 918 254 96221



TECHNICAL PROGRAMMING SERVICES, INC. 8506 EAST 6151 STRET TRESA DE 74133-1301 CIRCLE 838 ON READER SERVICE CARD

CHANGING WORD PROCESSORS?

Media transfer to or from-IBM, XEROX, DEC. WANG, LANIER CET CT MICOM MRI WORDSTAR, WORDPERFECT, MS/WRD, DW3. MULTIMATE, SAMNA, MASIL DCA. ******FREE TEST CONVERSION***** Conversion Specialists

531 Main St. Suite 835 El Segundo, CA 92045 (213) 545-6551 • (213) 322-6319

DISKETTE COPY SERVICE

DUPLICATION FROM 596

Attordable rates only 59¢ for 5.25" & \$1.59 for 3.50" MS/DOS Duplication. Price includes: Quality Rrown Disc Media Duplication with 100% verification *Label Application

*Nuick Turnament & Guaranteed Products Rates go even lower as you continue to order! DIVERSIFIED SYSTEMS GROUP, INC. P.O. Box 1114

Issaquah, WA 98027 800/255-3142 206/392-0900

There is no substitute for experience!

For software duplicaton backed by five years of experience, call the experts at Echo Data! Here's why we continue to be one of the nation's leading duplicators:

- · Round-the-clock production facilities. · Tough, 4 step quality control process.
- · 100% satisfaction guarantee policy.

WE'RE THE EXPERTS IN 3.5" DUPLICATION.



Echo Data Services, Inc. Lionville, PA 19353 800-533-4188 215-363-2400 In PA





EDITOR'S CHOICE

FACT FILE

Get The Word Out! Your Product Has Been Chosen EDITOR'S CHOICE.

Let us take your article to its highest level of marketing potential with a reprint!

To find out how you can have your article or review elegantly reprinted ** on 80 lb. paper stock, in 4-color, 2-color or 1-color, call or write today:

Jennifer Locke-Reprints Manager: Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016, 212-503-5447.

**Minimum quantity 500 reprints.

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

TO PLACE YOUR AD IN PC Magazine Marketplace Call (212) 503-5115 or (800) 825-4ADS FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

DISKETTE COPY SERVICE

New Datapath Diskette Duplication Systems

To get exactly the diskette duplicating capacity you need today, start with any IBM PC/XT/AT** or compatible Then install our Model 4D

Diskette Duplicator - at \$1005. It was only one slot in your PC, and produces up to 240 copies per hour Or for high-speed, unattended operation, add our new 312" or 5%" Desktop Autofoader-



at just \$2405 Datapath systems are expandable up to 8 drives. They run 31/2" and 51/4" drives simultaneously, and feature multiple formats - including

840 ON READER SERVICE CARD

systems so you can min un to 8 different jobs at once For more information, or to order, call today. 415-651-5580.

KEYCARD

\$99 18UE SPT \$99

(713) 781-9268

INOVELL AUTHORIZED RESELLE

LE 843 ON READER SERVICE CARD

HETWORK BUSINESS SYSTEMS

THITTE

288 a 308 \$50

SUPPLIES

ELIMINATOR

20s. 21. 8.21

PATCH DRIVE TAN

Datapath PS/2. They're multi-tasking C 1988 Datapath Technologies, Inc., 46710 Fremont Boulevard, Fremont, CA 94538, 415-651-5580

SUPPLIES

TONER CARTRIDGE RECONDITIONING

Laser Printers • Canon PC Copiers • Facsimile • Microfilm Copiers

LASER PRINTERS \$39.95 / PC COPIERS \$39.95 Call Toll Free 1-800-541-4548

or 1-800-543-4529 (In Mississippi) FREE DELIVERY **ASERCRAFTERS** TONER CARTRIDGE RECONDITIONING

6016 Slater Circle Pascagoula, MS 39567 (601) 475-4881 within Act, and receive a \$5 discount, OFFER exp. 5 12 89

DAY AIR

CIRCLE 845 ON READER SERVICE CARD

TONER CARTRIDGES anufacturing \$44.50. PC \$34.50. Colors \$64.50. 100% satisfaction. New cartridges

SPECIAL: When sending check m

from \$89.50. Series H. Bulk. 24 hours in & out.

Return Delivery 44.50 for laser cartridges 800-777-8444

SERVICK Dealerships

RIBBONS

1-800-331-6841 1-513-252-1247 (Ohio)

Over 350 types Volume Discounts Available

* * Satisfaction G		
		COLORS
APPLE IMAGEWRITER	2.60	3.60
APPLE 4-COLOR	_	8.95
DIABLO HT II M/S	2.25	
EPSON LX-80/90	2.25	3.50
EPSON MX-FX 80	2.50	3.50
EPSON MX-FX 100	3.50	4.50
IBM PROPRINTER	3.50	
NEC P1. 2. 6	4.95	
NEC P3, 7	4.65	
OKIDATA 82-92	1.15	1.50
OKIOATA 182-192	3.50	4.50
PANASONIC KXP	3.50	4.50

DAYTON COMPUTER SUPPLY

a division of Den-Sys Corp. 1220 Wayne Avenue, Dayton, Ohio 45410 EST: 1979 TERMS. MC. VISA. C.O.D. CIRCLE 847 ON READER SERVICE CARD

SOFTWARE PUBLISHING

GDS offers a wide variety of services that will help get your software to the market. Address. your needs with GDS

 IBM style cloth/vinyl 3-ring binders/slips · Labels, sleeves, disk pages, bulk diskettes

 Disk duplication with 100% vertitication Shrink wrapping and product assembly

· Quick turn-around A well packaged product can make the difterence in making a sale Call us now! VISA/MC GLENCO DEVELOPMENT SYSTEMS

721 West Algonquin Rd. Artington Hts., IL 60005 (312) 364-SOFT (7638)

NETWORKING

\$2,665°°

· Up to 180 copies per hour

. 51/4" or 31/2"

800-222-0490 tn NJ 201-462-7628 FAX 201-462-5658

MEGASoft P.O. Box 710, Freehold, NJ 07728

Full Service Duptication Facility

CIRCLE 841 ON READER SERVICE CARD

SOFTWARE PRODUCTION * Disk duplication

- * Atl formets
- * EVERLOCK copy protection
- Labet/sieeve printing Full packaging services
- * Werehousing
- * Drop shipping
- * Fulfittment
- 48-hour delivery
- * Consultation & guidance

Star-Bute, Inc.

800-243-1515 215,997,2470

CIRCLE BAS ON DEADED SERVICE CARD

SELL US YOUR EMPTY TONER CARTRIDGES SIG

CIRCLE 844 ON READER SERVICE CARD

TRAINING/ TUTORIALS

LEARN PROGRAMMING

'Anyone-can-learn' interactive diskettes over 100 pgms loaded w/Samples and Source * CLP-TRN1 for CLIPPER (Narriucket)

* FOX-TRN1 for FoxBASE + (Fox Software)
* DB3-TRN1 for dBASEIII + (Ashton-Tate) Learn by doing-draw Boxes. Menus, create Files. Indexes. Sort and Edit data. More advanced diskettes to tollow. Introductory price \$79/-each + \$5/-s&h (List \$99). Or DEMO only \$10/adjustable incl. s&h. Rush Check/MO:

BKC SYSTEMS, INC. 32-19 201 Street, Dept PCM Bayside, N Y 11361 (718) 428-0174

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible

They'll DIRECT their attention to PC Magazine Marketolace

For them PC Magazine Marketplace's Direct-Response/Display Ad format. represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the informatinn they want regarding price, volume discounts, specifications and delivery. If you think that your business can benefit from the 700,000 brand spec-

ifiers who read PC Magazine YOU'RE RIGHT! So take DIRECT action and call (212) 503-5115 or (800) 825-4ADS



EDITORIAL PRODUCT INDEX

SERVIC NUMBE	E R PRODUCT	COMPANY	PAGE	READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE	READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE
ADE	-IN BOARDS		_	407	Panasonic FX-	Panasonic Corp.	130	SOF	TWARE		
417	ConoDesk 6000	Conographic Corp.	207		BM89+ Fax Partner			445	CrossView	DataEase International	52
419	EiconScript Card	Eicon Technology Corp.	209	396	SMARTFAXplus	American Data Technology Inc.	98	426	Freedom of Press	Inc. Custom Applications	218
421	JetScript	QMS Inc.	219	CDA	DUICE /HAD	DWARE AND	_			Inc.	
428	JLaser Plus AT4	Tall Tree Systems	226		TWARE)	DWANE AND		427	GoScript	LaserGo Inc.	218
429	LaserMaster LC2	LaserMaster Corp.	226	301	WANE			441	Omniview,	Sunny Hill Software	46
418	CAPCard Controller PageStyler	Destiny Technology	207	443	Corel Draw!, Version 1.0	Corel Systems Corp.	56	455	Version 4.11 PC Tools Deluxe, Version 5	Central Point Software	48
422	PC Publisher Kit	Corp. QMS Inc.	224	HAR	DWARE		_	431	Personnel Policy	KnowledgePoint	
	Series II	amo mo:		454	Core HC-380	Core International	43		Expert, Version 1.0		
420	PS-388 Accelerator	Princeton Publishing Labs Inc.	214		Core CNT-MCA			456	Pizazz Plus	Application Techniques Inc.	46
AFT	ER HOURS			447	LazaGRAM	FX Unlimited	51	446 457	Send-Off! SideKick for	Intel Corp. Borland International	52 33
				450	Lundy 1612	Lundy Electronics and	51	43/	Presentation	Inc.	33
413	Andrew Tobias'	MECA Ventures Inc.	402	444	01-40-4	Systems Inc.			Manager	mo.	
412	Checkwrite Plus	MECOA Wantsung Inc.	404	444	SilentPartner	Presentation Electronics Inc.	51	451	Step IVward	Ashton-Tate	51
412	Andrew Tobias' Managing Your	MECA Ventures Inc.	404					458	SuperCalc 5	Computer Associates	33
	Money, Version 5			OPE	RATING SYS	TEMS	_	-		International Inc.	_
415	Bubble Ghost	Accolade Inc.	400	424	Merge 386	Locus Computing	162		EADSHEET A	NALYSIS	
411	QuotChart	Quotron Systems Inc.				Corp.		TRA	INING		
411	QuotData	Quotron Systems Inc.		425	VP/ix	Interactive Systems	168	432	OS/2 Programming	: Osborne/McGraw-Hill	54
411	Quotron Open Windows	Quotron Systems Inc.	406		Corp.		_	An Introduction UTILITIES			
411	QuotTerm	Quotron Systems Inc.	406	PRIN	ITERS						
416	Star Saga: One	Masterplay Publishing Corp.	400	448	NEC Silentwriter LC		51	433	Vtune	Emulation Technologies Inc.	54
	Wealth Insurance	Britannica Software	402		890XL	Systems Inc.					
414	TT GUILT HISGIUTIO	Direction College	TOL			O) atomo mo.					
_	APUTERS	Ditarina Dollware	702	_		O) Stories in c.					_
_	MPUTERS CompuAdd	CompuAdd	38		DUCTIVITY		_				_
COI	CompuAdd 286-20	CompuAdd Corp.	38	DEPARTS	DUCTIVITY	PROGRAM NAME/DESCRIPTI	ON				PAGE
COI	MPUTERS CompuAdd	CompuAdd		PC Lab	DUCTIVITY MENT I	PROGRAM NAME/DESCRIPTI				•••	233
442 449	CompuAdd 286-20 Dolch P.A.C. 386-25	CompuAdd Corp. Doich Computer Systems	38	DEPARTS	DUCTIVITY Notes	PROGRAM NAME/DESCRIPTION A guide to PC MagNet. Save time and paper prin		ıt progra	m listings and other A	SCII files on your	
442 449 DAT	CompuAdd 286-20 Doich P.A.C. 386-25 TABASE MANA	CompuAdd Corp. Dolch Computer Systems AGEMENT	38 52	PC Lab Utilities Environ	DUCTIVITY ABIT Notes ments	PROGRAM NAME/DESCRIPTION A guide to PC MagNet. Save time and paper print LaserJet. Adding your own moving	iting ou	to a date	and time display pro-	gram.	233 257 281
442 449	CompuAdd 286-20 Dolch P.A.C. 386-25	CompuAdd Corp. Doich Computer Systems AGEMENT Tools & Techniques	38	PC Lab Utilities Environ Power I	DUCTIVITY Notes ments Programming	PROGRAM NAME/DESCRIPTINA A guide to PC MagNet. Save time and paper print. aser.let. Adding your own moving The pros and cons of diff	ting ou	to a date	and time display pro- indexed files and file-i	gram. ndex structures.	233 257 281 291
442 449 DAT	CompuAdd 286-20 Dolch P.A.C. 386-25 CABASE MANA Data Junction 2.1	CompuAdd Corp. Dolch Computer Systems AGEMENT	38 52	PC Lab Utilities Environ Power I Spreads	DUCTIVITY Notes ments Programming sheet Clinic	PROGRAM NAME/DESCRIPTI A guide to PC MagNet. Save time and paper prin LaserJet. Adding your own moving The pros and cons of dift Adding hours, minutes,	ting ou g logic ferent l and se	to a date kinds of econds in	and time display pro- indexed files and file-in a SuperCalc workshe	gram. ndex structures. eet.	233 257 281 291 303
442 449 DA1 440	MPUTERS CompuAdd 286-20 Doich P.A.C. 386-25 TABASE MAN/ Data Junction 2.1	CompuAdd Corp. Doich Computer Systems AGEMENT Tools & Techniques inc.	38 52 36	PC Lab Utilities Environ Power I Spreads Spreads	DUCTIVITY MENT Notes ments rogramming sheet Clinic sheet Clinic	PROGRAM NAME/DESCRIPTION A guide to PC MagNet. Save time and paper print asserJet. Adding your own moving The pros and cons of diff Adding hours, minutes, Excel modifies certain vs.	ting ou g logic ferent I and se	to a date kinds of econds in intered in	e and time display pro- indexed files and file- a SuperCalc workshe a chart as unattached	gram. ndex structures. eet. I text.	233 257 281 291 303 304
442 449 DAT	CompuAdd 286-20 Dolch P.A.C. 386-25 TABASE MAN/ Data Junction 2.1 (BOARDS AT&T Fax	CompuAdd Corp. Doich Computer Systems AGEMENT Tools & Techniques	38 52	PC Lab Utilities Environ Power I Spreads Spreads	DUCTIVITY Notes ments rogramming sheet Clinic sheet Clinic	PROGRAM MAME DESCRIPTA A guide to PC MagNet. Save time and paper prin Adding your own movin The pros and cons of diff Adding hours, minutes, Excel modifies certain vs Print the current time at	ting ou g logic ferent I and se alues er the top	to a date kinds of econds in referred in or botto	e and time display pro- indexed files and file- a SuperCalc workshe a chart as unattached om of 1-2-3 workshee	gram. ndex structures. eet. I text.	233 257 281 291 303 304 304
442 449 DA1 440 FAX 397	CompuAdd 286-20 Dolch P.A.C. 386-25 FABASE MAN/Data Junction 2.1 BOARDS AT&T Fax Connection	CompuAdd Corp. Dolich Computer Systems AGEMENT Tools & Techniques Inc. AT&T	38 52 36	PC Lab Utilities Environ Power I Spreads Spreads	DUCTIVITY AGAIT Notes ments Programming sheet Clinic	PROGRAM MAME DESCRIPTING A guide to PC MagNet. Save time and paper prin Laserclet. Adding your own moving the pros and cons of diff adding hours, minutes, excel modifies certain vs. First the current time at Track your bootups with Suild a hard-disk menu s	g logic ferent i and se alues en the top an uni-	to a date kinds of econds in ntered in or botto document with or	e and time display pro- indexed files and file-in a SuperCalc workshe a chart as unattached om of 1-2-3 worksheer tited feature of CITY. Jinary DOS tools.	gram. ndex structures. eet. I text.	233 257 281 291 303 304 313 313
442 449 DA1 440	CompuAdd 286-20 Dolch P.A.C. 386-25 TABASE MAN/ Data Junction 2.1 (BOARDS AT&T Fax	CompuAdd Corp. Dolch Computer Systems AGEMENT Tools & Techniques Inc. AT&T Brother International	38 52 36	PC Lab Utilities Environ Power if Spreads Spreads Spreads User-to User-to User-to	DUCTIVITY HENT Notes ments Programming sheet Clinic sheet Clinic sheet Clinic -User -User	PROGRAM MAME/DESCRIPTINA A guide to PC MagNet. Save time and paper print LaserJet. Adding your own moving The pros and cons of diff Adding hours, minutes, excel modifies certain va Print the current time at rack your bootups with Buffel a batch disk menus.	g logic ferent i and se alues en the top an uni- system splays	to a date kinds of econds in ntered in or botto document with ord	e and time display pro- indexed files and file-in a SuperCalc workshe a chart as unattached om of 1-2-3 worksheer ted feature of CITY. linary DOS tools. Ichine's ID.	gram. ndex structures. set. text. ts.	233 257 281 291 303 304 304 313 313 313
442 449 DA1 440 FAX 397	CompuAdd 286-20 Dolch P.A.C. 386-25 T.A.BASE MANJ Data Junction 2.1 IS BOARDS AT&T Fax Connection Brother IntelliFAX The Complete	CompuAdd Corp. Dolich Computer Systems AGEMENT Tools & Techniques Inc. AT&T	38 52 36	PC Lab Utilities Environ Power I Spreads Spreads User-to User-to User-to	DUCTIVITY HEAT Notes ments rogramming regramming sheet Clinic sheet Clinic sheet Clinic	PROGRAM NAME DESCRIPTO A quide to PC MagNet. Save time and paper print Adding your own movin The pros and cons of diff Adding hours, minutes, Excel modifies certain va Print the current time at Track your bootups with Build a hard-disk menu s Create a batch file that di Use an alternative AUTO programs.	g logic ferent I and se alues en the top an uni- system splays EXEC t	to a date kinds of econds in ntered in or botto document with ord your maxim	e and time display pro- indexed files and file- ia SuperCalc workshe a chart as unattached om of 1-2-3 workshe tited feature of CITY. dinary DOS tools. ichine's ID. nize free memory for R	gram. ndex structures. let. t text. ls.	233 257 281 291 303 304 313 313 314 317
COI 442 449 DA1 440 FAX 397 399	MPUTERS Computed 286-20 Dioch P.A.C. 386-25 Dioch P.A.C. 386-25 BOARDS AT&T Fax Connection Brother IntellifAX The Complete Fax/9800 Connection	CompuAdd Corp. Dolich Computer Systems AGEMENT Tools & Techniques Inc. AT&T Brother International Corp.	38 52 36 101 108	PC Lab Utilities Environ Power I Spreads Spreads Spreads User-to User-to User-to User-to	DUCTIVITY HEAT Notes ments rogramming rogramming sheet Clinic sheet Clinic sheet Clinic Liser Liser Liser Liser Liser	PROGRAM MANIE DESCRIPTING Aguide to PC MagNet. Save time and paper print asserted. Adding your own moving laser-left. Adding your own moving movern proving the pros and cons of diff Adding hours, minutes print the current time arrival your post print the current time arrival your post print pr	g logic ferent i and se alues en the top an unit system splays EXEC t	to a date kinds of econds in ntered in or botto documen with ord your maxim nacros le	e and time display pro- indexed files and file-i a SuperCalc workshi a chart as unattached m of 1-2-3 worksheer ted feature of CITY. Imary DOS tools. ichine's ID. hize free memory for R t you create your pop-	gram. ndex structures. eet. text. tsxt. AM-hungry up menus and	233 257 281 291 303 304 313 313 314 317
### CONTROL 1442 1440 14	MPUTERS Computed 286-20 Dolch P.A.C. 386-25 ABASE MANJ Data Junction 2.1 BOARDS AT&I Fax Connection Brother IntelliFAX The Complete Fax/9500 Connection Compection C	CompuAdd Corp. Doich Computer Systems AGEMENT Tools & Techniques Inc. AT&T Brother International Corp. The Complete PC Intel PCEO	38 52 36 101 108 112	DEPARTI PC Lab Utilities Environ Power I Spreads Spreads Spreads User-to User-to User-to User-to Power I Langua	DUCTIVITY HEATT Notes ments rogramming rogramming heet Clinic heet Clinic heet Clinic Liser -User	PROGRAM IMME DESCRIPTI A quide to PC MagNet. Save time and paper prin Laser lett. Adding your own movin the pros and cons of diff Adding hours, minutes, princt the current time at a ready your bookups with Dreate a batch file that di Use an alternative AUTO programs. More of the principle of the principle More of the principle of the principle of the principle More of the principle of the principle of the principle of the principle More of the principle of the p	g logic ferent i and se alues en the top an uni- system splays EXEC to inced m	to a date kinds of econds in mered in o or botto document with ord your major maxim	e and time display pro- indexed files and file-in a SuperCalc workshe a chart a unttached or of 1-2-3 workshee ted feature of CITY. Jinary DOS tools. Inize free memory for R t you create your pop- ou write your own edi	gram. ndex structures. eet. text. tsxt. AM-hungry up menus and	233 257 281 291 303 304 313 313 314 317 319
COI 442 449 DA1 440 FAX 397 399 400 403 401	MPUTERS Computed 286-20 286-20 Dolch P.A.C. 386-25 386-25 ABASE MAN/ Data Junction 2. 1 BOARDS AT&I Fax Connection Brother IntelliFAX Tenglet Fax/9600 Connection Composssor Connection Co	CompuAdd Corp. Doich Computer Systems AGEMENT Tools & Techniques Inc. AT&T Brother International Corp. The Complete PC Intel PCE0 DEST Corp.	38 52 36 101 108 112 120 114	DEPARTA PC Lab Utilities Environ Power if Spreads Spreads Spreads User-to User-to User-to User-to User-to Langua Langua	DUCTIVITY MENT INNotes ments rogramming sheet Clinic sheet Clinic sheet Clinic	PROGRAM IMME. DESCRIPTIN A quide to PC MagNet. Save time and paper pain. Mediding your own moving The pros and cons of diff Adding hours, minutes, Excel modifies certain va Primit the current time. Friend your bootups with Save an attendative ALT/10 yourgards. Save an attendative ALT/10 yourgards. The provided of the provided of the provided of the provided of the Health of the Provided of the	g logic ferent I and se alues en the top an unit system splays EXEC t inced management	to a date kinds of econds in mered in o or botto document with ord your ma to maxim nacros le an help y IC BLOA	e and time display pro indexed files and file-i a SuperCalc workshe in a Charl as unattached m of 1-2-3 workshee m of 10-2-3 workshee ted feature of CITY. Jinary DOS tools. Ichine's ID. Jinze free memory for R tyou create your pop- ou write your own edi D header.	gram. ndex structures. eet. text. ts. AM-hungry up menus and tor.	233 257 281 291 303 304 313 313 314 317 319 325 326
COI 442 449 DA1 440 FAX 397 399 400 403 401	MPUTERS Computed 286-20 Dolch P.A.C. 386-25 ABASE MANJ Data Junction 2.1 BOARDS AT&I Fax Connection Brother IntelliFAX The Complete Fax/9500 Connection Compection C	CompuAdd Corp. Doich Computer Systems AGEMENT Tools & Techniques Inc. AT&T Brother International Corp. The Complete PC Intel PCEO	38 52 36 101 108 112	DEPARTI PC Lab Utilities Environ Power i Spreads Spreads Spreads User-to User-to User-to User-to User-to Langua Langua Langua	DUCTIVITY Who tes ments rogramming theet Clinic theet	PROGRAM NAME-DESCRIPTIN A quide to PC MagNet. Save Itine and paper print Laser-let. Adding your own moving The pros and cons of diff didding hours, minutes, bouch modifies certain va Track your bonding. Track your bonding. Track your bonding. Track your bonding. Track your bonding. Wordin-retes. 5.0° a dva- freely windows. Wordin-retes. 5.0° a dva- tely windows. The programs.	g logic ferent I and se alues en the top an unit splays EXEC t inced m ines ca ie BASi aligns s	to a date kinds of econds in mered in o or botto document with ord your ma or maxim nacros le an help y IC BLOA some vai	and time display pro- indexed files and file-i- a SuperCale works a in a chart as unattached on of 1-2-3 workshee inted feature of GITY. Jimary DOS tools. Ichine's ID. hize free memory for R t you create your pop- ou write your own edi D header.	gram. ndex structures. set. text. ss. LAM-hungry up menus and tor. sli it not to.	233 257 281 291 303 304 313 313 314 317 319 325 326 328
COI 442 449 DA1 440 FAX 397 399 400 403 401 398	MPUTERS Computed 286-20 286-20 Dolch P.A.C. 386-25 386-25 ABASE MAN/ Data Junction 2. 1 BOARDS AT&I Fax Connection Brother IntelliFAX Tenglet Fax/9600 Connection Composssor Connection Co	CompuAdd Corp. Doich Computer Systems AGEMENT Tools & Techniques Inc. AT&T Brother International Corp. The Complete PC Intel PCEO DEST Corp. Brook Trout	38 52 36 101 108 112 120 114 105	DEPARTA PC Lab Utilities Environ Power I Spreads Spreads Spreads User-to User-to User-to User-to User-to User-to Langua Langua Langua Langua	DUCTIVITY MENT INNotes ments rogramming sheet Clinic sheet Clinic sheet Clinic	PROGRAM IMME. DESCRIPTO A quide to PC MagNet. Save time and paper proving the defiding your own Medicing your own the prox and cons of different file prox and cons of different time prox and cons of different ime at Frack, your bootupes with frack your bootupes with create a batch file that die to see a matemative author to be to see a matemative author to programs. The proving and the different seed of the differe	ting out glogic ferent i and se silves en the top an unit system splays EXEC to the top and the top an unit system splays executed in the top and the top an	to a date kinds of conds in ntered in or botto document with ord your major macros le an help y IC BLOA some val in BASII	and time display pro- indexed files and file- in a SuperCale workshe a chart as unattached mor of 1-2-3 workshee tited feature of CITY. Sinary DOS tools. Ichine's ID. ize free memory for for t you create your pop- ou write your own edi D header.	gram. ndex structures. set. text. ss. LAM-hungry up menus and tor. sli it not to.	233 257 281 291 303 304 313 313 314 317 319 325 326 328 328
COI 442 449 DAT 440 FAX 397 399 400 403 401 398 402 409	MPUTERS Computed 286-20 Doich P.A.C. 386-25 386-25 386-25 ABASE MANI Data Junction 2.1 EBOARDS AT&T Fax Connection Brother intellifax The Complete Fax/9500 Connection Correction Fax/9507 Connection Correction Fax/9507 Connection Correction Fax/9507 Connection Correction Germana Correction Fax/9507 Connection Correction Correctio	CompuAdd Corp. Dokat Computer Systems AGEMENT Tools & Techniques Inc. AT&T Brother International Corp. The Complete PC Intel PCE DeST Corp. Broak Troot GammaLink Ricon Corp. GammaLink Ricon Corp.	38 52 36 101 108 112 120 114 105 116 134	DEPARTS PC Lab Utilities Environ Power if Spreads Spreads Spreads User-to User-to User-to User-to User-to Langua Langua Langua Langua Langua	DUCTIVITY Motes ments rogramming theet Clinic theet Clinic theet Clinic theet Clinic User	PROGRAM NAME-DESCRIPTIN A quide to PC MagNet. Save line and paper prin Laser-let. Midding your own moving The pros and cons of diff Adding hours, minutes, Excell modifies certain va Print the current time. The print the current time. Build a hard-dist menu: Teste a batch life that di Use an afternative AUTOI programs. Wordip-frect 5.0° a adva- ties under the programs. These Turbo Pascal rout Turbo Pascal 5.0 word- Make your text searches.	g logic ferent I and se alues en the top an unit system splays EXEC t inced m ines ca e BAS aligns s if faster P prog	to a date kinds of conds in the red in or botto document with ord your major maxim nacros le an help y IC BLOA some valin BASII fram can	and time display pro- indexed files and file-i a Super Calc workship a charl as unattached m of 1-2-3 workshee test feature of Chi inary DOS tools. chine's ID. tyou create your pop- ou write your own edi D header. The children of the children of the inaltes—even if you to without using assert be confusing.	gram. Index structures. Index structures.	233 257 281 291 303 304 313 313 314 317 319 325 326 328 328 333
COI 442 449 DA1 440 FAX 397 399 400 403 401 398 402 409 408	MPUTERS Computed 286-20 286-20 Dolch P.A.C. 386-25 386-25 ABASE MANA Data Junction 2.1 BOARDS AT&I Fax Connection Brother Intellif AX The Complete Fax/9800 Connection Connection Connection Connection Gordonessar FaxAdaii 96 Gammařax	CompuAdd Corp. Doich Computer Systems AGEMENT Tools & Techniques Inc. AT&T Brother International Corp. The Complete PC Intel PCEO DEST Corp. Brook Trout Technology Inc. GammaLink	38 52 36 101 108 112 120 114 105 116 134 132	DEPARTA PC Lab Utilities Environ Power I Spreads Spreads Spreads User-to User-to User-to User-to User-to User-to Langua Langua Langua Langua	DUCTIVITY MENT Notes ments rogramming rogramming heet Clinic heet Clinic heet Clinic Liser Lise	PROGRAM NAME. DESCRIPTIN A guide to PC MagNet, Save Item and pages principal and a save Item and pages principal and a large Item of the Item of Item	tring out glogic ferent I and se alues et alues et an un system splays EXEC to need mines ca e BASI aligns s faster P prog BIOS c	to a date kinds of econds in the red in or botto document with order or maximacros lean help y IC BLOA some varin BASII ram can causes se	and time display pro- indexed files and file-in a SuperCale workshe a chart as unattache mot 1-29 workshe mot 1-29 workshe treat properties (10) issues to solo to work of the tyou create your pop- ou write your own edio to header. The workshe without using assert be confusing, ome video routines to me did not solo to without using assert be confusing, ome video routines to	gram. Index structures. It lead. Is. AM-hungry up menus and tor. If it not to. bibly language.	233 257 281 291 303 304 313 313 314 317 319 325 328 328 333 333 333
COI 442 449 DA1 440 FAX 397 399 400 403 401 398 402 409 408	MPUTERS Computed 286-20 Doich P.A.C. 386-25 386-25 386-25 ABASE MANI Data Junction 2.1 EBOARDS AT&T Fax Connection Brother intellifax The Complete Fax/9500 Connection Correction Fax/9507 Connection Correction Fax/9507 Connection Correction Fax/9507 Connection Correction Germana Correction Fax/9507 Connection Correction Correctio	CompuAdd Corp to Computer Systems A GEM ENT Tools & Techniques Inc. AT&I Brother International Corp. The Complete PC Intel PCE Untel PCE Brook Trout Technology Inc. Gammail.ink Ricon Corp. Brook Trout Technology Inc. Gammail.ink Ricon Corp. Brook Trout Service Intel PCE Description Service Intel PCE Description Service Intel Service Intel Description Service Service Intel Description Service Service Intel Description Service Service Intel Description Service Service Intel Description Service Intel Descript	38 52 36 101 108 112 120 114 105 116 134	DEPARTI PC Lab Utilities Environ Power I Spreads Spreads Spreads User-to User-to User-to User-to User-to Langua Langua Langua PC Tuto PC Tuto	DUCTIVITY MINT Notes ments rooparuning heet Clinic heet Clinic heet Clinic theet C	PROGRAM MAME DESCRIPTIN Quide to PC MagNet. Save Itlem and pagnisser. Adding your own moving the pros and cons of difficulties of the prosess of the prosess of the prosess prosess of the prosess of the prosess print the current time at it rack your bootte. The print the current time at it rack your bootte. The print the build at hard-disk menu is been an alternative AIT of the prosess of the pro- together of the prosess of the pro- tom of the prosess of the pro- tom of the prosess of the pro- tom of the pro	tring out glogic ferent I and se alues et alues et an un system splays EXEC to need mines ca e BASI aligns s faster P prog BIOS c	to a date kinds of econds in the red in or botto document with order or maximacros lean help y IC BLOA some varin BASII ram can causes se	and time display pro- indexed files and file-in a SuperCale workshe a chart as unattache mot 1-29 workshe mot 1-29 workshe treat properties (10) issues to solo to work of the tyou create your pop- ou write your own edio to header. The workshe without using assert be confusing, ome video routines to me did not solo to without using assert be confusing, ome video routines to	gram. Index structures. It lead. Is. AM-hungry up menus and tor. If it not to. bibly language.	233 257 281 291 303 304 313 313 314 317 319 325 326 328 328 333 333 334
COI 442 449 DAT 440 FAX 397 399 400 403 401 398 402 409 408 410	MPUTERS Computed Comp	CompuAdd Computer Computer Doubt Computer Systems A GEMENT Tools & Techniques Inc. AT&T AT&T AT&T Brother International Corp. The Complete PC Intel PCC Intel PCC Brook Torut Technology Inc. Garmas Link Ricon Corp. Coustrant Limited Xerox Imaging	38 52 36 101 108 112 120 114 105 116 134 132 140	DEPARTI PC Lab Utilities Environ Power I Spreads Spreads Spreads User-to User-	DUCTIVITY MIST M	PROGRAM NAME-DESCRIPTIN A quide to PC MagNet. Save time and paper prin Laser, let. Adding your own moving The pros and cons of did Adding hours, minutes, Decel modifies certain va Track your booting. Track your booting the Build a hard-disk menu i Porate a batch file that did Jose an attenative ALTOI programs. Worlder letct. 5.0° a dava. Worlder letct. 5.0° a dava. Make your letx searches the output of the Pockset Turbo Pascal Footing the country of the Turbo Pascal So. World- Make your letx searches the output of the Footing the Turbo Pascal Footing the source of the Turbo Pascal Footing the source of the source of the Turbo Pascal Footing the source of the source of the source of the Turbo Pascal Footing the source of the	g logic lerent i gamma specific properties of the specific properties of th	to a date kinds of conds in mered in or botte document with or your majo	and time display pro- indexed files and file- in a SuperCale workshe a chart as unattached mod 11-23 workshe not 11-23 workshe inary DOS tools. Ichine's ID. its free memory for F t you create your pop- ou write your own edi D header. iables—even if you te without using seb be confusing, me video routines so er for sending comma ripe files.	gram. ndex structures. et. text. s. s. AM-hungry up menus and tor. ii if not to. biby language. return incorrect unds to the ANSI	233 257 281 291 303 304 313 313 313 314 317 319 325 326 328 333 333 334 334
COI 442 449 DAT 440 FAX 397 399 400 403 401 398 402 409 408 410	MPUTERS Computed 286-20 Doich P.A.C. 386-25 Doich P.A.C. 386-25 ABASE MANI Data Junction 2.1 EBOARDS ATAT Fax Connection Brother IntelliFAX The Complete Fax9600 Connection CoProcessor Facsimile Pack FaxMail 96 GammaFax ImageCard JT-Fax 9600	CompuAdd Corp to Computer Systems A GEM ENT Tools & Techniques Inc. AT&I Brother International Corp. The Complete PC Intel PCE Untel PCE Brook Trout Technology Inc. Gammal_ink Ricon Corp. Guadran_United Systems/Gatacopy Systems/Gatacopy Systems/Gatacopy Systems/Gatacopy Microlink International	38 52 36 101 108 112 120 114 105 116 134 132 140	DEPARTI PC Lab Utilities Environ Power I Spreads Spreads User-to User-to User-to User-to User-to Langua Langua Langua PC Tutt PC Tutt PC Tutt PC Tutt PC Tutt	DUCTIVITY WEST Notes Thomas of the second	PROGRAM NAME-DESCRIPTIN Quide to PC MagNet, Save time and pagnet, save time and pagnet, save time and pagnet, the pross and costs of diffi- diding your own movin, the pross and costs of diffi- sized in modifies certain vs. Print the current time at Print the current time at Save and the print of the Save and the print of the WordPerfect 5.0° advant help windows. These Turbo Pascal rout bowder the print of the PCAM to be print the print of the PCAM the print the print of the PCAM to be print the print of the PCAM to be print the print of the PCAM the print of the PCAM to be print the print of the print of the PCAM to the pcame to	g logic lerent i gamma g	to a date kinds of conds in the red in or botte document with our syour major maxim macros le an help y lic BLOA some valuin BASIII ram can causes so charact by very late data file	and time display pro- indexed files and file- in a SuperCalc workshe a chart as unattached mot 11-23 workshe mot 12-30 w	gram. ndex structures. et. taext. AM-hungry up menus and tor. if it not to. obly language. return incorrect inds to the ANSI 64K.	233 257 281 291 303 304 313 313 313 314 317 319 325 326 328 333 333 334 334 334 334
COI 442 449 DA1 440 FAX 397 399 400 403 401 398 402 409 408 410 404	MPUTERS Compuded 269-20 269-20 269-20 269-20 269-25 269-25 269-25 269-25 269-25 269-25 269-25 269-269-269-269 269-269-269-269 269-269-269 269-269-269 269-269 269-269-269 269-	CompuAdd Depth Computer Systems AGEMENT Tools & Techniques Inc. AT&I Brother International Corp. The Complete PC Intel PCE DEST Corp. Brook Trout Ricon Corp. Quadram Limited Partnership Partnership Partnership Microlink International Inc.	38 52 36 101 108 112 120 114 105 116 134 132 140 122	DEPARTI PC Lab Utilities Environ Power is Spreads User-to User	DUCTIVITY WHAT Notes Notes Programming sheet Clinic	"ROORAM NAME.OSCRIPTIN Quide to PC MagNet, asset time and pages principal and the pages principal and the pages principal and the pages principal and the pages and the pages and consolidation and the pages and consolidation and the pages principal and the pages pages principal and the pages page	titing ou logic from the logic from	to a date kinds of conds in the red in o document with ord your major maxim nacros lean help y IC BLOA some varing BASIC ram can causes so charact by very late s from e data files from e data	and time display pro- indexed files and file- indexed files and file- a SuperCale workshi a charl as unattached interest and substantial file interest and substantial file interest file file file file file file file file	gram. ndex structures. et. taext. AM-hungry up menus and tor. if it not to. obly language. return incorrect inds to the ANSI 64K.	233 257 281 291 303 304 313 314 317 319 325 326 328 333 334 334 334 336
COI 442 449 DA1 440 FAX 397 399 400 403 401 398 402 409 408 410 404	MPUTERS Computed 286-20 Dolch P.A. 386-25 386-25 ABASE MANI 386-25 ABASE MANI Data Junction 2.1 BOARDS ATSI Fex Connection Brother intelliFAX The Complete Fax/9600 Connection Corrocessor Facsimile Pack Fax/dail 96 Gamma	CompuAdd Corp to Computer Systems A GEM ENT Tools & Techniques Inc. AT&I Brother International Corp. The Complete PC Intel PCE Untel PCE Brook Trout Technology Inc. Gammal_ink Ricon Corp. Guadran_United Systems/Gatacopy Systems/Gatacopy Systems/Gatacopy Systems/Gatacopy Microlink International	38 52 36 101 108 112 120 114 105 116 134 132 140	DEPARTI PC Lab Utilities Environ Power is Spreads Spre	DUCTIVITY MENT Motes ments	PROGRAM MAME DESCRIPTIN Quide to PC MagNet. Save time and paper print Jaser. Jack and consolidation of the Madding your own moving the pros and consolidation He pros and consolidation Print the current time at 1 rack your bootune. Print the current time at 1 rack your bootune Track your bootune The surface was He will be surfaced He surface Madding to the Madding to the Madding to Madding to Mad	titing out of the second of th	to a date kinds of econds in the red in or bottom or with ore your major macros le an help y IC BLOA some valuin BASI ram can causes se charactery very la e data file sicompution or with the red in	and time display pro- indexed files and file- in a SuperCalc workshi a chart as unattached mot 1-2-3 workshi may DOS tools. Chine's ID. It you create your pop- ou write your own edi b neader. I without using assert be confusing. without using assert be confusing. we wideo routines to er for sending comma rgo files. Is that are larger than anding batch files prem graf.	gram. ndex structures. et. taext. AM-hungry up menus and tor. if it not to. obly language. return incorrect inds to the ANSI 64K.	233 257 281 291 303 304 313 313 314 317 319 325 326 328 333 333 334 334 334 334 334 334
442 449 DAT 440 FAX 397 399 400	MPUTERS Compuded 269-20 269-20 269-20 269-20 269-25 269-25 269-25 269-25 269-25 269-25 269-25 269-269-269-269 269-269-269-269 269-269-269 269-269-269 269-269 269-269-269 269-	CompuAdd Depth Computer Systems AGEMENT Tools & Techniques Inc. AT&I Brother International Corp. The Complete PC Intel PCE DEST Corp. Brook Trout Ricon Corp. Quadram Limited Partnership Partnership Partnership Microlink International Inc.	38 52 36 101 108 112 120 114 105 116 134 132 140 122	DEPARTS PC Lab Utilities Environ Power I Spreads Spreads User-to User-to User-to User-to User-to Tutc PC Tutc PC Tutc Connec Con	DUCTIVITY WHAT Notes Programming Program	"ROORAM NAME.OSCRIPTIN Quide to PC MagNet, asset time and pages principal and the pages principal and the pages principal and the pages principal and the pages and the pages and consolidation and the pages and consolidation and the pages principal and the pages pages principal and the pages page	titing out of the control of the con	to a data to a data to conds in thered in or botto document with or your ma nacros le an help y IC BLOA an east an east east an east an east an east east east east east east east east	and time display pro- indexed files and file- in a SuperCale workshe a chart as unattached motified and file- indexed files and file- indexed files and file- indexed files and file- indexed files indexed files indexed files indexed files indexed files indexed files indexed inde	gram. ndex structures. et. taext. AM-hungry up menus and tor. if it not to. obly language. return incorrect inds to the ANSI 64K.	233 257 281 291 303 304 313 314 317 319 325 326 328 333 334 334 334 336

PC MAGAZINE # APRIL 11, 1989

ΕΔΟΥ ΔΟ

□ Education

2. Your primary job function

☐ Engineering/No.
☐ Finance/Accounting

☐ Administrative/General

☐ Marketing/Sales

Management

is (check one):

MIS/DP. Communications

Systems, Programming Engineering/R&D

products?

□ 10 or k

m.
26-100

n.

100 or more

Are there any PC s in your office? (Check all that apply.)

a. Linked to mainframe p. Linked to mini

☐ Networked together

1

10 or less



Fill in your name and address and check off your answers to the eight research questions. (One card per person, please.)



Circle the numbers on the card that correspond to the ads or articles you'd like more information about. (Numbers for advertised products are repeated in the Advertiser Index



☐ In 4 to 6 months

☐ In 6 to 12 months

□ No definite plans

8. Number of employees in

your entire company?

25 or less

100-499

500-999

1000 or more

26-99 ٧.

u.

Company.

City_

Please send me one year (22 issues) of PC Magazine for \$29.97. I'll save 54% off the annual newsstand price of \$64.90. (Annual basic subscription price is \$44.97.) Offer valid in U.S. and passessions only. IOW TO STAY ON TOP OF WHAT'S IN THE PC MARKET"

USE THIS CARD TO OBTAIN FREE INFORMATION ABOUT PRODUCTS AND SERVICES IN THIS ISSUE (SEE OTHER SIDE)



NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 33854 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 40049 Philadelphia, PA 19106-9871

laallidaa allilaa dhabda labdaalaalliabd



NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 33854 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 40049 Philadelphia, PA 19106-9871



COMING UP

DATA TRANSFER SPECIAL Find your way through the complicated world of data transfer and media conversion using a special multipart cover story as your guide.

- The 3½-inch Conversion Getting your data from AT-class machines equipped with 51/4-inch drives to laptops or PS/2s equipped with 31/2-inch drives is a bothersome chore. It can be made easy either by installing a 31/2-inch drive in your AT or by using file transfer software and cable to send the information across. PC Labs investigates the options and takes you through the installation process.
- Format Conversion Software It's a simple task to move your text files from one word processor to another, but it isn't so easy to reenter all your tab settings, underlining, and margins after they've been lost in the shuffle. Solve the problem with format conversion software that guarantees a smooth translation for your text files.
- From PC to Mac Because the Macintosh and PC environments both offer a wealth of indispensable programs, communication between the two is essential. Read a detailed overview of the dozens of products that have been designed to facilitate this integration.
- From PC to Mainframe Why not discover the new ease of half-inch nine-track magnetic tape as a means of transporting data between PCs and mainframes? It's an idea whose time has come. . . again.

VIRUSES The virus threat is real, but you can protect yourself with one of several affordable antivirus programs, ranging in price from \$10 to \$189. PC Magazine reviews 11 protection packages, gives you the facts on the virus syndrome, and explains how simple common sense may be the best protection you'll ever have.

DISKLESS LANSTATIONS By adding diskless LANstations to your network. you gain smaller footprints, quieter operation, and security. Frank J. Derfler, Jr., evaluates models from ALR, Corman Technologies, Dell, Earth Computer Technologies, NCR, Network Innovations, Racore, 3Com, and Unisys.



PC MAGAZINE ADVERTISING SALES STAFF One Park Avenue, New York, N.Y. 10016 (212) 503-5100

National Advertising Director - Richard Marino Director of Sales - Telemarketing - Nancy Newman Telemarketing Supervisor - MaryJo Boudinot

Senior Advertising Coordinator - Jane L. Gottlieb Advertising Coordinator - Allyson Dubin

Al Di Guido - Eastern Advertising Manager (212) 503-5310

MA, NH, VT, ME, RI, CT Sloan Seymour - District Manager (617) 497-2632 Vickie Pinsky - District Sales Representative 4 Cambridge Center Kendall Square Cambridge, MA 02141 (617) 497-2633 Scott Budd - Account Representative (212) 503-5132

NY, NJ, PA Joseph Gillespie - District Manager (212) 503-5294 Mary Arlotto - District Sales Representative (212) 503-5149 One Park Avenue New York, NY 10016 Jeannie Buechner - Account Representative

(212) 503-5333 John McGuiness - Account Representative (212) 503-5227

DE, MD, DC, VA, WV, NC, SC, AL. MS. TN. AR, KY, GA, FL Scott J. Seltz - District Manager Mark Crafts - District Sales Representative

3405 Piedmont Road Atlanta, GA 30305 (404) 239-9780 Karen Halloran - Account Representative (212) 503-5130

David Fales - Central Advertising Manager (212) 503-5114

NE, WI, IL, IN, MN, MO, OH, MI, IA, ND, SD, Canada

Pete Foster - District Manager 180 N. Michigan Avenue Suite 1400 Chicago, I. 60601 (312) 346-7666 Jay Overbye - Account Representative (212) 503-5126 Doug Dauray - Account Representative (212) 503-5047

Pete Foster - District Manager

TX, OK, LA, KS, UT, NM, CO Stephen Shore - District Manager Sandy Schackman - District Sales Representative 5956 Sherry Lane Suite 1330 Dallas, TX 75225 (214) 691-6934 Hene Morris - S ene Morris - Senior Account Representative (212) 503-5104

Jonathan Lane - Western Advertising Manager (415) 378-5525

CA (San Francisco & North), ID, OR, WA Mike Kisseberth - District Manager (415) 378-5527 (415) 376-3527 Debra Silver-District Sales Representative 110 Marsh Drive, Suite 103 Foster City, CA 94404 (415) 378-5520 Lee Uniacke - Account Representative (212) 503-5129

CA (Santa Barbara to So. San Francisco). WY, MT, AK

Gini Talmadge - District Manager (415) 378-5521 (910) 376-3021 Steve Moorman - District Sales Representative Kathryn Mandahl - District Sales Representative 110 Marsh Drive, Sulte 103 Foster City, CA 94404 (415) 378-5528 Richard Vandervoorn - Account Representative

CA (LA, San Diego & Orange County), AZ, NV, HI

Debra Huisken - District Manager
Robin Kofsky - District Sales Representative
David Lynn - District Sales Representative
Paul Kien - District Sales Representative 18500 Von Karman Ave. Suite 510 Irvine, Ca. 92715 (714) 852-8001 (714) 852-8001

Beth Gartenberg - Account Representative (212) 503-5040

Christina Lynch - Account Representative (212) 503-5113 - Account Representative





Bubble Ghost: A Haunting Game of Skill And Finesse

BY ILONA PRICE

If you think computer animation games can be challenging, amusing, and engrossing. Accolade won't burst your bubble. In fact, if you break all of the bubbles in Accolade's Bubble Ghost, you lose.

This \$34.95 game of finesse and perspective, for one or two players, is set in the late inventor Heinrich Von Schtinker's 35-room haunted castle. The object of the game is to manipulate Heinrich's spirit (a.k.a. Bubble Ghost) so that the ghost blows a bubble through the 35 rooms of the castle, past all of Von Schtinker's mad inventions, most of which are fatal to bubbles. The graphics are exceptional, and each room of the castle is full of imaginative detail and brilliant colors.

Like all bubbles, the one in this game is delicate. If it hist one of the many obstacles, it bursts and you lose one of your six allotted bubbles. The bubble goes nowhere until you figure out how to get by these objects. Solving one of these puzzles carns you 5.000 points. The answer is usually simple, but not always obvious. In one room, a fan blows the bubble back toward the hapless ghost, no matter how hard he puffs. The solution is to shut off the fan, but how? Questions like this are the heart of the game, and set Bubble Chlors apart from other arcade-style games.

Each time you complete a level your ghost earns an extra bubble. Once you pass through all of the rooms in the castle, the ghost is set free and the castle is no longer haunted.

The Bubble Ghost himself is indestructible. He can touch obump into any obstacle without injury. If you make the poor spirit blow too hard, however, he turns red and you lose 1,000 points.

Bubble Ghost requires skill, patience, and careful planning. A practice mode lets you practice any level of the game, which is useful when a particular level is giving you difficulty. It is not difficult to grasp the object of the game, but you must put thought into your escape from the castle and be very careful not to "blow it" by bursting all of the bubble all of the bubble all of the bubble and the particular to the cast of the particular to the particul

List Price: Bubble Ghost, \$34.95.
Requires: 256K RAM, DOS 2.1 or later, CGA graphics. Not copy protected. Aecolade Inc., 550 S. Winchester Blvd., #200, San Jose, CA 95128: (408) 296-84(0).

CIRCLE 415 ON READER SERVICE CARD



PC Meets Game Board As Star Saga: One Mixes Old and New

BY DONALD B. TRIVETTE

During a space plague in the year 2490, the Earth and eight nearby planets banded together in a confederation named Nine Worlds. To keep alien diseases from ever again devastating its inhabitants, the confederation built an impenetrable wall called "The Boundary" to separate Nine Worlds from the rest of the cosmos.

That's the opening premise of Star Saga. One, a multimedia game for one to six players that involves not only your PC but also a game board and tokens. You and your fellow gamesters select your characters from a cast that includes Laran Davis. An Tymer, a hotshot pilot; and Lee Dambroke, a university xenobiologist.

Star Saga is not a conventional computer game with colorful maps, snazzy sound, and wild animation. Nor is it the usual Adventure-like text game. Instead. Star Saga is a hybrid role-playing board game that uses the computer to direct the play as a human moderator might. At each turn, you go to the computer and tell it who you are, and then you tell it how you played your turn. The Computer Game Master—a.k.a. the Chubby Grey Monitor—tells you the results of your move and directs you to read passages from the Star Stage text.

Reading is what this game is really about, and the Star Saga text covers hundreds of pages. Although you need read only those passages that apply to your character, even that can involve a considerable amount of text. You must also read the 12page booklet that introduces the game, sets the rules, and describes your character. As the game progresses, players compete against one another for position, resources, and knowledge, but in the end everyone must cooperate to banish a common foe.

Star Saga: One is not somebours before a movie. Indeed, the manual advises that just one game may take 60 hours. Fortunately, it doesn't have to be completed in a single sitting. List Price: Star Saga: One.

\$79.95. Requires: 256K RAM, DOS 2.0 or later. Not copy protected. Masterplay Publishing Corp., 8417 Sun State St., Tampu, FL 33634; (813) 888-7773.

CIRCLE 416 ON READER SERVICE CARD



ADVERTISERS PRODUCT INDEX

RS#	ADVERTISER	PRODUCT PAGE#
ACC	OUNTING SOFTWARE	
482	Bedford Software Limited	Accounting Software
102	Computer Associates	ACC PAC12-13
194	Cougar MT Software Dac Software	ACT 2 250 Duc Easy Accounting 74-75 Accounting Software 106-107
263 301	Macnia Inc	ACT 2
301	PC Exchange Peachtree Software	Accounting Software
358	Peachtree Software	Double Bonus Bundle
470 227	SBT Corp Sourcemate Information Systems	Database Accounting Library
	BASE MANAGERS	ADDUMENT 1 100 17
377	Borland International	Paradox 3.0
494 134	Ruttonware	PC File/DB
134	Clarion Software	PC File-DB 168 Professional Developer 70 R & R Relational Report Writer 165 PC Secret 222
113	Concentric Data Systems Information Builders	H & H Helational Heport Writer
244	Oracle	PC/Focus 232 Database Management Software 42
	Oracle Oracle	PC-Focus PC-
529	Public (Software) Library	Shareware Software
FILE	SYSTEMS & ACCESS ME	
529	Dac Software Public (Software) Library	Rolodex 74-75 Shareware Software 162
	NCIAL PLANNING SOFT	
315	Concentric Data Systems	Trend Setter Expert
	Intuit Software	Quicken
INFO	RMATION MANAGERS	
113	Concentric Data Systems	R & R Relational Report Writer 165
LANC	GUAGES	
137	Borland International	Turbo Pascal
380	Hammerly Computer Services	Pro Bas
380 280	Hammerly Computer Services LaserGo Inc.	Pro Bas Tool Kit. 326 Go Script 21
	Microsoft	Quick Basic 4.5 324
331	Microway	Fortran Compiler 330
OPER	RATING SYSTEMS/ENVII	RONMENTS
349	DSC Communications	DSC Nexos 135
192	Quantum Software Systems, Inc.	ONX 153
PRO	GRAM DEVELOPERS/GE	NERATORS
380	Hammerly Computer Services Hammerly Computer Services	Pro Bas
380 529	Hammerly Computer Services Public (Software) Library	
		Shareware Software
	JECT MANAGEMENT	
134 201	Clarion Software Haventree Software	Professional Developer 70 Project Management Software 170
249	Symantec	Timeline
STAT	ISTICAL SOFTWARE	
315	Concentric Data Systems	Trend Setter Expert
101	SPSS, Inc	SPSS/DATA Analysis Software
TEXT	EDITORS	
188	Command Technology Corp	SPF/PC
369	Golden Bow Systems	VQ4
	ITIES	
234	3X USA	3X-Link 16
120	Central Point Software	PC Tools Deluxe 5 0
113 256	Concentric Data Systems Delta Technology	PC Tools Detuce 5 0 22 P & FR Relational Report Writer 155 P & FR Relational Report Writer 155 Sideways Noteworkey, Inword 64-69 Pro Bas 256 Pro Screen 256 Pro Screen 256 Po Screen 366 Go Script 27 PC KWIK 314
323	Funk Software	Sideways, Noteworthy, Inword
380	Hammerly Computer Services	Pro Bas
380 167	Hammerly Computer Services Helix Software	Headmon 326
280	LaserGo Inc.	Go Script
	Multisoft Corporation	PC KWIK
302	Peter Norton Computing Rose Electronics	Montari ark
302 290 334	Softlogic Solutions	Libity 260-261 Master Link 228 Disk Optimizer 39
	D PROCESSING SOFTW	ARE/AIDS
200	AGEA Compunitables	Type Director 208
200	AGFA Compugraphics Concentric Data Systems	Type Director
113	Concentric Data Systems	Type Director 209 R & R Relational Report Writer 165 Go Script 21
155	LaserGo Inc. Metro Image Base, Inc. MicroPro International	Go Script 21 Clip Art 316
480	MicroPro International	Clip Art 316 WordStar 5 342-343 Wordprocessor 129
248 316	Timeworks Zylab Corporation	Wordprocessor 129
		ZY Index 16
SPRE	ADSHEET/TEMPLATES	1
	Dac Software Dac Software	Lucid 3-0
237 323	Funk Software	Always 131
323	Funk Software	Allways 131 Sideways, Noteworthy, Inword 68-69 Exel 2-3
282	Microsoft Personics Corp	Extel
202		Look and Link
DA1		
PAY	ROLL/PERSONEL Dac Software	Dac Easy Payroll

RS#	ADVERTISER PRODUC	T	PAGE
DESK	TOP PUBLISHING		
200	AGFA Compugraphics AGFA Compugraphics	Type Director	20
200	AGFA Compugraphics	Type Director	20
280	LaserGo Inc. Swite International, Ltd.	Go Script	2
744	Z-Soft	Publisher's Paintbrush	22
	ENTRY SOFTWARE		
74	Formworx Corp.	Formuny	16
	RTAINMENT SOFTWARE	Formworx	
	Wesson International	*	32
203		Tracon	32
HOME	MANAGEMENT SOFTWARE		
	Dac Software	Dec Easy Light	74-7
	DESIGNERS		
140	Bloc Development	Form Designers	6
385 174	Deerfield Systems, Inc. Formworx Corp.	Display Forms II	31
		Politiwork	10
	ATIBLE KEYBOARDS		
515 513	Wells American Wells American	Compu Star	1
723	Zeos International	Keyboards	33
	UP SOFTWARE		
185	Westlake Data Corp.	PC Fullback	31
	BACKUP & TAPE DRIVES	TO THOUGH	
		DO Tools Debug C D	8
120 370	Central Point Software Corel Systems	PC Tools Deluxe 5.0 Optical Disk Drive	
286	Fifth Generation	Fastback Plus	18
193	Kinson Products	Hard Disk Drive	27
	Maxell 700	Tape Backup	7
530 384	Swan Technologies/TCP Tecmar Inc	Tape Back Up	24-2
	DISKS		
217		Decisionals	33
351	Dual Group Hard Drives International	Peripherals Hard Drives	
	Plus Development	Plus Passport	272-27
	Seagate	Hard Disk Drives	24
COMP	UTERS/COMPATIBLES		
493	Advanced Logic Research	Computer Systems	30-3
270	Altec Technology Corp.	PC Compatibles	17
179 335	Amax Engineering American Mitac	Amax Computers	20
166	AST Research	Computer System	145-14
509	Auctin Computers	Compatibles	10-1
481	Bull Dog Computer Products	Computer/Accessories	60-€
252	Clone Computers Computer Discount Warehouse	Compatibles	36
163	Computer Products United	PC Compatibles	310-31
483	Damark International	Compatibles	36
536	Dataworld	PC's	13
536 536	Dell Computer Corporation Dell Computer Corporation	Dell Computers	
379	Dyna Computers	30 MHZ 386.	17
216	Everex Systems, Inc Fivestar Electronics, Inc.	Step Computers	80-8
319 213	Fivestar Electronics, Inc.	Compatibles	30
213 338	Gateway 2000 Hyundai	A Loringanese A Loringanese Paragon 769 VE Computer System Computer System Computer System Computer System Computer System PC Computers Desire System PC Computers Solid System S	
	Hyundai IBM	Computers Compatibles	24-2
:	Northgate Computer Systems	Compatibles	25
	Northgate Computer Systems Northgate Computer Systems Northgate Computer Systems	Flenance	28
	Northgate Computer Systems	Elegance	284-28
	Northgate Computer Systems	Compatibles, 286/12	288-28
303/308	Northgate Computer Systems	Elegance Compatibles, 286/12 3 Choice Compatibles	306-30
303/306 309/304	PC Brand PC Brand PC Brand	Compatibles	182-15
310/311	PC Brand	Compatibles	184-18
372	PC Designs PC Network, The New	Compatibles	25
353/535	PU Network, The New Sun Microscopters	Compatibles Compat	351-35
366	Sun Microsystems Sun Microsystems	3861	160-16
530	Swan Technologies/TCP	Compatibles	22-2
		Compatibles	33
264	Tandy Corporation Vendex	Computers	
731	Vendex	Computers	
515 513	Wells American	Compu Star	
513	Wells American	Compu Star	
721	Zeos International	Compannies	
	TDEVICES		
742	Diamond Flower Electric Instru Dual Group	Hand Scanner	
217 182	Logitech	Peripherals	238.21
•	Microsoft	HI Resolution Mouse	26
233	Mitsubishi Int. Corp.	Mouse	
	Northgate Computer Systems	Keyboards	32
	RAMMERS TOOLS UTILITIES		
116	Blaise Computing Golden Bow Systems	Programming Tools	30
369			



Andrew Tobias' Checkwrite Plus: A Detailed Approach to Bill Paving

BY GUS VENDITTO

Is a PC a good tool for managing your checkbook? Only if it makes the work go faster. That means getting the checks out the door more easily and spending less time sweating over a complicated balance sheet.

Andrew Tobias and the other folks who brought you Andrew Tobias' Managing Your Money have decided to take a crack at this seemingly simple job. They know a lot about personal finance, but they sure don't know how to make checkbook management simple.

I'd heard a lot about Ouicken and had been meaning to give it a try. Ouicken has been spectacularly successful because it prints checks easily and keeps simple records that you can customize into splendid sophistication. The way I heard it. Andrew Tobias was going to go Ouicken one better, with a program that's easier to use and that provides more value in the long run by putting some order into household budgeting.

Checkwrite Plus. After 20 minutes of fumbling in and out of Budget Categories, Money Accounts, and Loan Recordswithout succeeding in getting my checking account set up-I ran, nearly screaming for mercv. to Ouicken. In less than 5 minutes, I was busily printing checks.

l dutifully returned to Checkwrite Plus for the purposes of this review. The interface is inherited from Managing Your Money and the structure is designed to organize your cash flow. It encourages you to have discipline, requiring that you pay attention to assigning payments to categories.

The manual guides you through the intricacies of predicting loan payments before it gets to the task at hand, printing checks.

If you want a program that will automate your bill paying, remember long account numbers, print checks in a flash, and save records, get Quicken. If you want to analyze your cash situation, set aside a few hours to pore over Andrew Tobias' Checkwrite Plus.

List Price: Andrew Tobias' Checkwrite Plus, \$69.95 Requires: 256K RAM, DOS 2.0 or later. Not copy protected. MECA Ventures Inc., 355 Riverside Ave., Westport, CT 06880; (800) 835-2246

CIRCLE 413 ON READER SERVICE CARD

So I tried both, starting with You fill In the blanks to pay your bills with Andrew Tobias' Checkwrite Plus and then assign the payments to categories for detailed budgeting, Unfortunately, it's not as easy as it sounds.

Wealth Insurance tracks your hypothetical fortunes in each of the available scenarios. When income is down. expenses must he cut



PERSONAL FINANCE

The 1990s Economy: Wealth Insurance Looks Ahead

BY PHILLIP F. H. ROSE

It's the spring of '92, now 3 vears into the Great Depression of the 1990s. Few saw it coming; even Black Monday in '87 didn't shake people up. Today the Dow is sitting at around 200, with unemployment at about 25 percent. But you are sitting pretty. You shorted stocks on the way down and have an extra \$20,000 sitting in T-bills. You still have your job, and you are just waiting for the stock market to heat up.

This is one scenario that you can play through in Wealth Insurance, a new financial simulation program based on the predictions of Paul Erdman, author of The Crash of '89. You take your finances through one of two scenarios for the '90s: depression or recession. Or you can see how well you would have done in the '30s depression, the '61 recession, or the '80s "boom" years.

Several good sources, including Erdman's own book What's Next?, offer solid advice on how to prepare for the bad economic times ahead. But nothing hits home quite as effectively as facing the news, in this game, that your income has been cut by four-fifths and your mortgage must still be paid.

The game's main shortcoming is that it misses a golden opportunity to use the computer's power. You should be able to translate your current financial state into 1929 dollars and replay the Great Depression. Or plug in your actual numbers for 1981 and relive the 1980s with hindsight. Instead, the game forces you, when playing the historical scenarios, to assume a randomly assigned portfolio.

Other shortcomings arise from limits on your control over the game. Even if you make a simple typo and buy a Texas condo rather than New York land, you are stuck with it. You also cannot edit your personal financial statistics after leaving the first screen

Rough economic times may be ahead. Of course, Wealth Insurance supports Erdman's predictions, but anyone can gain by playing the game and experimenting with strategies. List Price: Wealth Insurance.

\$39.95. Requires: 512K RAM. CGA or EGA video card, DOS 2.0 or later. Not copy protected. Britannica Software, Blue Chip Software Series, 345 4th St., San Francisco, CA 94107; (800) 572-

CIRCLE 414 ON READER SERVICE CARD

RS# 395	ADVERTISER PC Exchange	PRODUCT Programmers Tools Utilities	111000	RS#		ODUCT	PAGE#
MULT	FIFUNCTION BOARDS	Trogramma roota Coming		MICRO 124	-MAINFRAME LINKS Attachmate	Many Marketonia Consessionia	201
	Computer Discount Warehouse	Mail Order	205			Micro Mainframe Connectivity	301
ADD-	ON BOARDS			MODE	Computer Discount Warehouse	Mail Order	205
	Computer Discount Warehouse	Mail Order	365	217	Dual Group	Peripherals	336
297	Dac Software Intel	Breakthrough Connection Co-Processor	74-75	136	Hayes Microcomputer Products	Moderns	
190	Orchid Technology			231 367	Touchbase Systems Universal Data Systems	Worldport Series Moderns Moderns	28
268	Swan Technologies/TCP	VGA Board		DISKE	TTES		
	INERS/DIGITIZERS			·		Diskettes	201
135	Complete PC	The Complete Scanner	90	267	3M Data Recording Products Div 3M Data Recording Products Div	Diskettes	203
PRIN				INSUF	ANCE		
172	Bay Technical Associates Computer Discount Warehouse	Print Master II	290	728	Safeware	Insurance	210
109	Computer Discount Warehouse	Printers	369	POWE	R PROTECTION		
363 491	Eastman Kodak Hewlett Packard-Peripheral Gro	Oiconix 150 Printer		533	Kensington Microware LTD.	Masterpiece	100
	Hewlett Packard-Peripheral Gro Hewlett Packard-Peripheral Gro	Desk Jet HP Laser Jet Printer HP Laser Jet Printer Quickwriter	215	381 473	Para Systems, Inc.	Minuternan Power Supplies	72
326	Hewlett Packard-Peripheral Gro IBM Corp	HP Laser Jet Printer	216		PC Power and Cooling	Power Supplies	1/9
280	LaserGo Inc	Go Script	210-219		CESSORIES		
726 259	Mannesman Tally	Go Script	312	232	American Technology Labs Curtis Manufacturing	Disk Saver	143
	The Laser Connection	Big Bin	5	473	PC Power and Cooling	PC Accessories	179
234	TER ACCESSORIES 3X USA	***************************************	i	RETA	L/DISTRIBUTORS		
288	Fifth Generation	3X-Link 16. Logical Connection 25 in One Fonts. Master Switch	117	222	Selco	Toshiba Products	300
288 126 290 290 290	Pacific Oata Products, Inc.	25 in One Fonts	78	MAIL	ORDER		
290	Rose Electronics Rose Electronics	Master Switch	228	254	47 Street Computers	Mail Order	44-45
	Rose Electronics	Master Link		336	Arlington Computer Products	Mail Order	354-355
PORT	ABLE/LAP COMPUTER			509	Austin Computers Bay Express	Compatibles	10-11
	Computer Discount Warehouse	Mail Order	365	481	Bull Dog Computer Products	Computer/Accessories	60-61
195	Computer Discount Warehouse Intelligence Technology Corp.	LAP Tops "CAT" Cellular Laptop Laptops	367	355	Business To Business Compu Add	Mail Order, Printers	347 492
321	Toshiba of America	Laptops	190-191	294	Compu Add	Mail Order	346, 349
337	Zenith Data Systems	386 Turbo Sport, Portables			Computer Discount Warehouse	Mail Order	365
PC-FA				183 178	Computer Mailorder Computer Casis	Mail Order	242-243
250	Brooktrout Technology	Fax Mail	125	229 352	Educational Testing Service	Mail Order	371
247	Computer Discount Warehouse Xerox Imaging Systems	Mail OrderFax Board	365	352 266	FASTMICRO Gentech	Mail Order	53
OPTH	CAL PERIPHERALS			243 346	Jade Computer Products	Mail Order	
	Compact Oisc Products	CD-ROM/WORM	274	346 280	Jameco Electronics LaserGo Inc.	Mail Order	368
	LAYS/MONITORS/TERM			387	MHI Warehouse Inc	Mail Order	364
	Computer Discount Warehouse	Mail Order		129	Micro Warehouse MICROBEST	Mail Order	174-175
	Computer Discount Warehouse	Monitors VGA Display Multisync 2A Color Monitors	367	303/308	PC Brand	Compatibles	180-181
153	Magnavox NEC Home Electronics Inc	VGA Display	344345	309/304	PC Brand	Compatibles	182-183
150	Sarntron	Color Monitors	204	310/311	PC Brand PC Connection	Compatibles	184-185
490	Seiko Instruments	Monitors	58		PC Connection PC Exchange	Mail Order	195-199
	PHICS SOFTWARE			301 395	PC Exchange PC Exchange	Accounting Software	309
743 174	Digital Research Formworx Corp.	Artine		353/535	PC Network, The New	Mail Order	351-353
380	Hammerly Computer Services	Formwork Pro Bas	326	295 184	RP Systems Shamrock	Mail Order	361
380	Hammerly Computer Services Micrografix	Pro Bas Telecom Tool Kit	326		Softline	Mail Order	
143	Personics Corp	Graphics SoftwareUltra Vison		375	Software Add-Ons	Mail Order	92
	Software Publishing	Harvard Graphics	141	206 123	Telemant Telemant	Mail Order	88.89
744	Z-Soft	Publisher's Paintbrush	ELU	220	Tenex Computer Express	Mail Order	366
	TERS/CHARTING DEVI			268 105	Tussey Computer Products USA Flex	Mail Order	362-363
117	Houston Instruments	Hi Pad Plus	200		Warehouse Data Products	Mail Order	252
AIDE	O GRAPHICS/BOARDS			171 721	Warehouse Data Products Zeos International	Mail Order	253
190	Computer Discount Warehouse Orchid Technology	Mail Order Pro Designer Series	121			Cons	229-231
ACCE	LERATOR BOARDS			ONLI	NE DATABASES		
276	Hauppauge	386 Motherboards	32	497	Dow Jones News/Retrieval PC Magnet	News Retrieval	
COM	MUNICATIONS SOFTW						
120	Central Point Software	PC Tools Deluxe 5.0			T MARKETING CONNECT		051.055
198	Core International			336	Arington Computer Products Bay Express	Mail Order Mail Order	354-355 366
278 504	Crosstalk Communications Data Storm Technologies Inc			355 252	Business To Business Clone Computers	Mail Order	357
504 380	Data Storm Technologies Inc Hammerly Computer Services	Pro Comm		252	Clone Computers Compu Add	Mail Order	360
224	Norion-Lambert	Close Up		294	Compu Add	Mail Order	346 349
	MUNICATIONS				Computer Discount Warehouse	Mail Order Mail Order	365 367 369
290	Rose Electronics	Master Net		109	Computer Discount Warehouse Computer Discount Warehouse	Mail Order.	367
	MUNICATIONSOFTWA			178	Computer Oasis	Mail Order	
735 287	nton Technologies Xpedite Systems	Co-SessionPC-Xpedite	318	483 229	Damark International Educational Testing Service	Mail Order	
	AL AREA NETWORKING		131	229 243 346	Jade Computer Products	Mail Order	370
234	3X USA	OM 1 (-1 40		346 387	Jameco Electronics MHI Warehouse, Inc.	Mail Order Mail Order	370 368 364 350
278	Crosstalk Communications	Remote Lans. Logical Connection Main Lan. LAN.	76		MICROREST	Mail Order	350
	Fifth Generation Main Lan	Logical Connection	117	353 535 295	PC Network. The New PC Network, The New	Mail Order Mail Order	
288		Main Lan	280	205	PU NEWORK, THE NEW	Mail Order	352-353
230 149	Newbridge Networks, Inc.						
288 230 149 290	Newbridge Networks, Inc. Rose Electronics			184	RP Systems Sharnrock	Mail Order.	356
288 230 149 290 290 239	Newbridge Networks, Inc. Rose Electronics Rose Electronics Western Oigital	Master Net Master Switch Ethernet LAN	228	184 220 268	Sharmock Tenex Computer Express Tussey Computer Products	Mail Order Mail Order Mail Order	356



Andrew Tobias Shows You How to Manage a Modest or Major Fortune

BY CHRISTOPHER BARR

Andrew Tobias' Managing Your Money is the nenu-driven alternative to having a personal financial adviser, private secretary, and bookkeeper. It's not a difficult program to master, but, like your parents used to tell you about any complex project, you only get out of it what you put into it.

Created by Andrew Tobias, the author of a number of best-selling books on personal investing, Managing Your Mony: is a complete system that lets you keep control of your income and outgo. Since it's not written in a double-entry, accounting-only style, this software can be appreciated by young people with only a checking account, as well as by more sophisticated investors with complicated portfolios.

Although the multiplicity of menus may drive a power user crazy, the program has a consistent, easy-to-learn user interface. There is context-sensitive help throughout the software, which is organized as a series of "chapters."

Managing Your Money operates as a series of connected databases that track all the assets and liabilities that make up your financial body. The core of the program tracks two main areas of your finances—your budget (including your checkbook) and your investment portfolio. The rest of the program helps with topics like estimating your federal income taxes, determining how much insurance you should carry, and setting up your kid's college fund.

In the Budget and Checkbook chapter, you track all of your money accounts. This includes checking, savings, and charge-card accounts. The number of accounts you can set up is limited only by storage.

Setting up accounts is not difficult, but it is time-consuming. Fortunately, both the manual and the on-line help are written with an ease and humor that make the tedium of the setup easier to bear. After you've finished this task, it shouldn't take more than an hour or two a week to keep your record current. Once an account has been entered—a checking account, for instance—you can work with the account and spend or receive

Spending consists of writing checks for any other kind of disbursement), while deposits are recorded as money received. When you record a check, you can allocate the amount to a predetermined budget category and thus track your spending. You can purchase preprinted checks and have Managing Your Money actually print them.

The Budget and Checkbook duptor has some other useful functions. You can forecast cash flow and track loans, for instance. If you have a small business, you can call up an accounts-payable module, and a receivables module.

The other major section of Managing Your Money is the Portfolio Manager. This is where you keep track of the bulls and bears, stamps and coins, and other equity instruments you own. It doesn't mailer if you have one investment or 100; Managing Your Money can track them all. You can establish taxable, nontaxable, cash-management, and hypothetical portfolios. Unfortunate-thetical portfolios. Unfortunate-tickly, dividends and interest aren't calculated and added automatically. You'il have to do that yourself.

Not the least important of Managing Your Money's tools is the Financial Calculator. Among other things, it will analyze your retirement package, tell you if you should refinance your mortgage, or scare you to death with the cost of junior's Harvard education. The most fun you'll have is when you get to chapter 8, which calculates your net worth. Managing Your Money considers all of the proper asset and liability accounts, recognizes which accounts to include and which to ignore, and calculates your worth.

Managing, Your Money comes on five 360K disks and requires only 256K RAM and a single disk drive, but you will want a hard disk and a minimum of 512K for maximum productivity. Managing Your Money uses 1.5MB of disk space before you enter your first cord. Version 5.0, updated to reflect the tax code that sapplicable for the tax year of 1988, does not use either expanded or extended.

memory.

Andrew Tobias' Managing
Your Money is the complete financial management tool it
claims to be. It won't tell you
which stocks to buy or sell,
when to refinance your mortage, or when to invest in Japanese yen futures. But good,
sound fiscal advice is available
to you on practically every
serven.

List Price: Andrew Tobias'
Managing Your Money. Version
5.0, \$219.98. Requires: 256K
RAM, DOS 2.0 or later. Not copy
protected. MECA Ventures Inc.,
35ceristics and Street Ave., Westport, CT
06880; (800) 835-2246.

CIRCLE 412 ON READER SERVICE CARD



After you establish the budget categories, Andrew Tobias' Managing Your Money exports the taxable projections to be used in the Tax Estimator chapter,



INDEX TO ADVERTISERS

RS#	ADVERTISERS	PAGE	RS#	ADVERTISERS	PAGE	RS#	ADVERTISERS PAGE
	3M Data			FASTMICRO		372	PC Designs2
	3M Data			Fifth Generation		301	PC Exchange3
	3X USA			Fifth Generation		395	PC Exchange 2
	47th St. Computer			FiveStar Electronics		353	PC Network, The New 3
	Advanced Logic Research			FormWorx Corp		535	PC Network, The New 352-3
	AGFA Compugraphics			Funk Software		473	PC Power & Cooling 1
	Altec Technology Corp			Funk Software		358	Peachtree Software 2
	Amax Engineering	267		Gateway 2000	93	282	Personics Corp
335	American Mitac	111	266	GenTech	305	143	Personics Corp
232	American Technology Labs	336	369	Golden Bow Systems	4	302	Peter Norton Computing260-2
336	Arlington Computer Products	354-355	380	Hammerly Computer Services	326		Plus Development 272-2
166	AST Research	145-147	351	Hard Drives International	331	529	Public (Software) Library 1
124	Attachmate	301	276	Hauppauge	32	192	Quantum Software Systems, Inc
	Austin Computer			Haventree Software		290	Rose Electronics
	Bay Express			Hayes Microcomputer Products		295	RP Systems
	Bay Technical Associates			Helix Software		728	Saleware
	Bedford Software Corp			Hewlett Packard		150	Samtron 2
	Blaise Computing			Hewlett Packard		470	SBT Corp
	Bloc Publishing			Houston Instruments		-770	Seanate 2
	Borland International			Hyundai		222	Selco
	Borland International			IBM		490	Seiko Instruments
	Brooktrout Technology			IBM		184	Sharnrock
				Information Builders		184	
	Buildog Computer Products					334	Softline
	Business to Business			Intel			Softlogic Solutions
	Buttonware			Intelligence Technology Corp		375	Software Add-Ons
	Central Point Software			Intuit		l :	Software Publishing
	Clarion Software			Jade Computer		227	Sourcemate Information Systems
	Clone Computers			Jameco Electronics		101	SPSS, Inc
188	Command Technology Corp	152	533	Kensington Microware, Ltd	100	366	Sun Microsystems 159-1
	61 Compact Disk Products			Kinson Products		299	SWFTE International, Ltd
135	Complete PC	90	280	LaserGo, Inc	21	249	Symantec
294	CompuAdd Corp	346-349	182	Logitech	238-239	289	Tandy Corp
	CompuAdd Corp		263	Macola, Inc	106-107	264	Tandy Corp
102	Computer Associates	12-13		Magnavox	337	384	Tecmar Inc
	Computer Discount Warehouse			Mannesmann Tally		123	Telemart
	Computer Discount Warehouse			Maxell		206	Telemart 88-
	Computer Discount Warehouse			Metro Image Base, Inc.		220	Tenex Computer Express
	Computer Mail Order			MHI Warehouse, Inc		259	The Laser Connection
	Computer Oasis			Micro Warehouse		248	Timeworks, Inc
	Computer Products United			MICROBEST		321	Toshiba of America 190-
	Concentric Data Systems			Micrografx		231	Touchbase Systems
	Concentric Data Systems			Micropro International		735	Triton Products
	Core International			Microsoft		268	Tussey Computer Products
	Corel Systems			Microsoft		530	Tussey Computer Products
	Cougar Mt. Software			Microsoft		367	Universal Data Systems
	Crosstalk Communications			Microway		105	USA Flex 358-3
				Mitsubishi International Corp		230	US Sage
	Curtis Manufacturing					230	
	Dac Software			Multisoft Corporation		704	Vendex
	Dac Software			NEC Home Electronics Inc		731	Vendex
	Damark International			Newbridge Networks, Inc		171	Warehouse Data Products 252-2
504	Datastorm Technologies Inc			Northgate Computer Systems		513	Wells American
•	Dataworld			Northgate Computer Systems		515	Wells American
385	Deerfield Systems			Northgate Computer Systems		203	Wesson International3
•	Dell Computer Corporation			Northgate Computer Systems		239	Western Digital
	Dell Computer Corporation			Northgate Computer Systems		485	Westlake Data
	Delta Technology			Norton-Lambert		١.	Wordperfect Corp2
	Diamond Flower Electric Instrument			Oracle		247	Xerox Imaging Systems
743	Digital Research			Oracle		287	Xpedite Systems
•	Dow Jones News/Retrieval			Orchid Technology		744	Z-Soft
349	DSC Communications	135		Pacific Data Products, Inc		337	Zenith Data Systems
	Dual Group			Para Systems, Inc		723	Zeos InternationI
				8 PC Brand	180, 181	721	Zeos International
217		178	303/30				
217 379	Dyna Computers						
217 379 363		220-221	309/30	4 PC Brand	182-183	316	Zylab Corp



QuotData supplies information to programs such as Microsoft Ex-

cel (right side of screen) and

to QuotChart.



PERSONAL FINANCE

Small Investors Hit the Big Time with Quotron Open Windows

BY TONY RIZZO

What major advantage do professional stockbrokers have over the lowly "small investor"? The smug answer would have to be "insider trading." But in all seriousness, access to information is the key to modern-day investment analysis and strategy

Where do the pros get this valuable information? The ubiquitous Quotron terminal is the primary professional trading tool to have emerged over the last decade or so. This weapon puts a wide assortment of financial data right at the professional investor's fingertips. What can the serious small

investor do to compete with the big boys, especially when the heavyweights have easy access to all this critical information? Simple-join the club. With Quotron Open Windows, a Microsoft Windows-based collection of applications designed by Inmark in conjunction with Quotron Systems, the little guy can do just that.

QuotTerm

Ouotron Open Windows consists of three specific applications, the first of which, Quot-Term, provides complete emulation of the professional's Quotron terminal. QuotTerm supports all standard terminal features but, because it is Windows based, it offers substantial visual enhancements over the standard, character-based terminal. All of the usual Windows features are available. For instance, you can resize the Quot-Term window and point and click with the mouse to obtain quotes or news stories. Blink rates and colors can be user defined to customize the display of information about securities.

OuotData

Along with OuotTerm comes OuotData, an application that functions as a database and server for financial data. Every sort of historical financial fact is available on-line from Quotron via the underlying Quotron network. Even more important. QuotData collects real-time, tick-by-tick data on securities. futures, and other instruments.

in the process of building a userdefined database of absolutely current information. It also dis-

tributes the information. QuotData acts as a server for other Windows programs (Microsoft Excel, for example), with which it communicates through Windows' Dynamic Data Exchange (DDE) protocol. The database information becomes available to other applications either in real time, as QuotData actively collects data, or through stored historical information

QuotChart

QuotChart rounds out the trio of applications that make up Ouotron Open Windows. As its name suggests, QuotChart is an advanced and very sophisticated charting and analysis tool. Its features go well beyond those of any other charting package that I've seen.

Charting historical data is simple. You define the data and the desired time frame, and then apply your analysis. Just about everything can be done by pointing and clicking with the mouse. As many as eight charts at a time instantly come to life. displaying trendlines, moving averages, Gann angles, and much, much more. And best of all, it's all in real time.

come without a price. After all, this is the very same software professional traders use. Quotron charges monthly fees for the use of the applications, and there is a one-time, \$500 installation charge. In addition, you will need fairly heavy-duty PC hardware, probably including at

Such sophistication does not

least 2MB of RAM, to use these Is it necessary to install Quotron Open Windows to manage your first employee stock options purchase? Of course not. But if you are a serious investor with a great deal of time on your hands and money invested in your portfolio, membership in the big boys' fraternity is now

List Price: Ouotron Open Windows installation fee, \$500. Requires: 80286- or 80386-based PC. Microsoft Windows, List Price: QuotChart,\$300 monthly fee. QuotData, \$250 monthly fee. QuotTerm, \$100 monthly fee. Requires: 2MB RAM (640K RAM for QuotTerm), hard disk, serial port, EGA or VGA graphics.

open to you.

mouse, DOS 3.2 or later. Not copy protected, Quotron Systems Inc. 12731 W. Jefferson Blvd., Los Angeles, CA 90066; (213) 302-4621

CIRCLE 411 ON READER SERVICE CARD

AFTER HOURS INDEX

Andrew Tobias' Managing Your Money Software that minds your budget and tracks your investments

Andrew Tobias' Checkwrite Plus A complicated solution to a simple task: managing your

checking account. Wealth Insurance How to hold on to what

you've got in the uncertain future

Bubble Ghost

An imaginative, arcadestyle game for boys and ghouls of all ages. Star Saga: One A hybrid game that com-

bines the PC with a traditional board game.

PC MAGAZINE . APRIL 11, 1989

Technically speaking, the Dell System 325 is the most advanced 386™ computer we've ever built.

And, according to PC Magazine, it's one of the most advanced 386 computers they've ever tested.

In benchmark after benchmark, the System 325 ran circles around a field of 386-based 25 MHz systems. A field that included the Compaq[^] 386/25.

A show of prowess that earned the System 325 PC Magazine's we've sold to date, each and every one has been individually configured to fit the needs of its owner.

The System 325 takes that idea to its logical extreme.

For example, it runs either MS-DOS, OST, or our own Dell UNIX*System V. Which is compatible with AT&Ts System V Interface Definition. And the whole world of XENIX*applications. If speed is of the essence, we

can include an optional Intel[^] 80387 or WEITEK 3167 math coprocessor.

And since nothing about this system is lightweight, the mass storage is a 90 MB ESDI disk drive. Or we can configure it with a 150 or 322 MB unit.

As you might expect, the output is just as intense. You can choose between VGA mono with paper white screen, or VGA Color Plus, for high resolution colors displayed on

THE DELL 386 SYSTEM 325 HAS A 25 MHz CLOCK RATE, CACHE MEMORY CONTROLLER, 90 MB 18ms ESDI DRIVE, PAGE MODE INTERLEAVED MEMORY, AND 100% COMPATIBILITY WITH MS-DOS, OS/2 AND UNIX SYSTEM V.

Editor's Choice award.

It was a goal we set for ourselves from the very beginning. And an objective anyone with a penchant for power and performance can appreciate.

A PERSONAL COMPUTER THAT'S REALLY PERSONAL

Of the more than 150,000 personal computers



a larger screen.

Even though the System 325 gives you all this performance, it still leaves you six open slots for whatever else you might want to add.

And once you've told us what you want, we'll make sure what you want works—by burning-in the

entire system unit.





"The new top Dell System 325 is a flagship worth putting out in front of the fleet."

For the full story, see inside back cover. February 14, 1989

